FOR OFFICIAL USE ONLY.

Vol. 12. No. 5. pp. 255-326. May, 1942

IMPERIAL MYCOLOGICAL INSTITUTE
4 MAY 1942

THE VETERINARY BULLETIN

1942

IMPERIAL BUREAU OF ANIMAL HEALTH
WEYBRIDGE, SURREY
ENGLAND

Price 5/- net Annual Subscription £2

Imperial Agricultural Bureaux.

EXECUTIVE COUNCIL

SHAMALDHARI LALL, C.I.E., I.C.S., Officiating High Commissioner, *Chairman*	India and Burma.
J. A. CALDER, C.M.G., *Vice-Chairman*	Colonies, Protectorates and Mandated Territories.
Sir DONALD FERGUSSON, K.C.B.	United Kingdom.
Vacant	Canada
F. L. McDOUGALL, C.M.G.	Australia.
F. J. DU TOIT	Union of S. Africa.
NEVILL L. WRIGHT, F.I.C., D.I.C.	New Zealand.
J. M. ADAMS, F.R.C.Sc.(I)	Eire.
D. JAMES DAVIES, C.B.E.	Newfoundland.
W. C. ROBERTSON	Southern Rhodesia.
Sir DAVID CHADWICK, K.C.M.G., C.S.I., C.I.E.	Secretary.

STAFF OF IMPERIAL BUREAU OF ANIMAL HEALTH, WEYBRIDGE

Director :

T. DALLING, M.A., M.R.C.V.S.,

Deputy Director and
Editor of The Veterinary Bulletin and of Index Veterinarius :

W. A. POOL, M.R.C.V.S.

Second Officer :

J. TWEEDALE EDWARDS, M.R.C.V.S.

Assistants :

RUTH ALLCROFT, B.Sc., Ph.D.

G. EIRA JONES, B.A.

MOYA RIMINTON.

ENID M. SMEDLEY, M.Sc.

CONTENTS

LIST OF CHIEF SUBJECTS

[Many subjects dealt with are omitted from the list and will be found in the appropriate places. Particular subjects sometimes appear under different headings: *e.g.* Tuberculosis may appear under:– Diseases Caused by Bacteria and Fungi; Immunity; Diseases, General (papers on several diseases); Public Health; Therapeutics; Technique; Reports and Book Reviews].

	PAGE
DISEASES CAUSED BY BACTERIA AND FUNGI...	255–270
Mastitis	255
Streptococci	256
Staphylococci	256
Anthrax	256
Tuberculosis	257
Swine erysipelas	263
Haemophilus infection	263
Pasteurella infection	263
Salmonella infection...	263
Brucella infection	265
Anaerobic infection	268
Various	269
DISEASES CAUSED BY PROTOZOAN PARASITES	270–273
Trypanosomiasis	270
Leishmaniasis	270
Trichomoniasis	270
Malaria	271
Piroplasmosis	272
Anaplasmosis	272
Sarcosporidiosis	272
Leptospirosis...	273
DISEASES CAUSED BY VIRUSES AND RICKETTSIA	273–278
Foot and mouth disease	273
Rinderpest	274
Equine encephalomyelitis	274
Swine fever	275
Porcine encephalomyelitis	275
Rabies	276
Aujeszky's disease	276
Distemper	277
Influenza	277
Fowl plague	278
Rickettsiasis	278
IMMUNITY [including allergic and serological diagnosis] ...	279–286
Tuberculin test	279
Staphylococcal immunity	283
Tuberculosis immunity	283
Immunization against swine erysipelas and swine fever ...	286
PARASITES IN RELATION TO DISEASE [ARTHROPODS]	287
Fly control	287
Linguatulosis	287
PARASITES IN RELATION TO DISEASE [HELMINTHS]...	287–291
Trematodes	287
Cestodes	287
Nematodes	288
DISEASES, GENERAL [Diseases not dealt with under other headings, organic diseases, miscellaneous diseases and neoplasms]	291–298
Livestock diseases in Peru	291
Swine plague (identity)	292
Diseases of foxes, nutria and mink	293
NUTRITIONAL AND METABOLIC DISORDERS	298–302
Various	298
Vitamins	300
PHYSIOLOGY	303–305
POISONS AND POISONING ...	305–307
THERAPEUTICS	307–314
Of bacterial infections	307
Of protozoan infections	309
Helminthiasis	310
PUBLIC HEALTH	314–316
TECHNIQUE	316–319
MISCELLANEOUS	319–321
REPORTS	321–325
South Africa	321
India	323
U.S.A.	324
Europe	325
Sweden	325
BOOK REVIEWS	325–326

INDEX TO AUTHORS

Abramov, G., 270.
Accousti, N. J. See Martin, G. J., et al., jt. authors, 312.
Ajello, P., 296.
Alegren, A., 325.
*Alkewitz, W., 274.
Allanson, K., 258.
Almaden, P. J. See Wahlin, J. G., jt. author, 269.
Andersen, T. T., 294.
—, & Tulinius, S., 293.
Anderson, E. O. See Weirether, F. J., et al., jt. authors, 307.
Asher, T. See Trautman, A., jt. author, 303.
Asplin, F. D., 301.
*Aygün, S., 292.

Bachlechner, K., 287.
Bär, F. See Neufeld, F., jt. author, 313.
Baker, A. H., & Twort, C. C., 315.
*Baldo, J. I., Jonckheer, R., & Vasquez, D., 257.
Baranow, A. G., 293.
Barnes, J. M., & Trueta, J., 285.
Barnes, W. A. See Furth, J., jt. author, 295.
Bartram, M. T., Welch, H., & Ostrolenk, M., 265.
Beckwith, T. D. See Morgan, H. R., jt. author, 265.
Beller, K., 320.
Benbrook, E. A. See Runnells, R. A., jt. author, 296.
Benditt, E. See Sunderman, F. W., et al., jt. authors, 314.
Bernheim, F. See Saz, A. K., jt. author, 270.
Biltz, R. O. See Klein, L. A., et al., jt. authors, 307.
Birkhaug, K., 284.
Blacklock, D. B., & Southwell, T., 326.
Bloch, K. See Lewisohn, R., et al., jt. authors, 298.
Bobalić, M., 284.
Boddie, G. F., Corner, H. H., Morgan, D. O., & Sloan, J. E. N., 311.
Bok, T. K., 302.
Boley, L. E., Levine, N. D., Wright, W. L., & Graham, R., 310.
—. See also Sampson, J., jt. author, 298.
Bolin, F. M. See Vardiman, P. H., et al., jt. authors, 275.
Bottino, C. G. See Humoller, F. L., et al., jt. authors, 265.
Boughton, I. B., & Hardy, W. T., 268.
*vom Bowert, H., 303.
*Brandt, H., 265.
Braude, R., Foot, A. S., Henry, K. M., Kon, S. K., Thompson, S. Y., & Mead, T. H., 300.
Britton, J. W. See Howell, C. E., jt. author, 310.
Bronson, L. H., & Parker, R. F., 285.
Brown, H. See Perlman, H. H., et al., jt. authors, 308.
Browne, J. S. L. See Rose, B., jt. author, 281, *bis*.
Bryan, C. S., 256.
Buddingh, G. J., & Womack, F. C., Jr., 267.
*Buzna, D. See Marcis, A., jt. author, 279.

*Caccarelli, A. See Paltrimeri, S., et al., jt. authors, 270.
Carlström, B., Lövgren, O., & Sjöberg, K., 301.
—, —, & Sjögren, B., 301.
Carta, A., 288, 296.
Casós, G. A., 274, 291.
Castellana, A., 256.
—, & Ramini, E., 256.
Cauthen, G. E. See Porter, D. A., et al., jt. authors, 311.
Cerruti, C. G., 263.
Chapman, C. W. See Karel, L., et al., jt. authors, 308.
Chase, M. W. See Landsteiner, K., jt. author, 279, *ter*.
Cheaver, F. S., & Janeway, C. A., 297.
Chick, H., & Ellinger, P., 306.
Christensen, J. F. See Foster, A. O. et al., jt. authors, 309.
Christian, T. T. See Schmidt, H., et al., jt. authors, 306.
Cilli, V., 274.
Coggeshall, L. T., & Maier, J., 310.
Colwell, C. A., & Youmans, G. P., 282.
*Conti, M., & Sarti, G., 263.
Corner, H. H. See Boddie, G. F., et al., jt. authors, 311.
Corradetti, A., 271.
Cowgill, G. R. See Street, H. R., et al., jt. authors, 301.
Crofton, H. D. See Stewart, W. L., jt. author, 311.
Cronin, A. G. See Loofbourow, J. R., et al., jt. authors, 296.
Crowley, J. H. See Nigg, C., et al., jt. authors, 282.
*Csemba, J., 312.
Cummins, S. L., 284.

*Daddi, G., & Panà, C., 261.
Dann, L. Glücksmann, A., & Tansley, K., 304.
—. See also Hughes, A. F. W., jt. author, 304.
David, J. D., & Yakub Shah, K. M., 300.
Deen, M. M. See Farbrother, E. S., jt. author, 323.
Dennis, W. R. See Wolfe, W. R., jt. author, 306.
*Derzsy, D., 303.
Dick, G. F., & Leiter, L., 295.
*Didion, H., 317.
Doll, E. R. See Durant, A. J., jt. author, 295.
Dougherty, R. W., 303.
Durant, A. J., & Doll, E. R., 295.
Dwyer, C. M. See Loofbourow, J. R., et al., jt. authors, 296.

Earle, D. P., Jr., & Victor, J., 299.
Ecker, E. E. See Pillemer, L., et al., jt. authors, 306.
Edward, D. G. ff. See van den Ende, M., et al., jt. authors, 315.
Ehrismann, O., 269.
Eichhorn, A. See Manthei, C. A., jt. author, 318.
Ellinger, P. See Chick, H., jt. author, 306.
Elvehjem, C. A. See Waisman, H. A., jt. author, 326.
Emerique-Blum, L. See Javillier, M., jt. author, 300.
van den Ende, M., Edward, D. G. ff., & Lush, D., 315.
—, & Spooner, E. T. C., 315.
—. See also Thomas, J. C., jt. author, 315.
Engel, S., & Grüneberg, H., 296.
*Enrum, K. H., 259.
Errington, B. J., & Westerfield, C., 310.
Exner, F. M., & Luria, S. E., 278.

Farbrother, E. S., & Deen, M. M., 323.
*Ferroni, P., 260.
*Fichtner, S., 258.
Findlay, G. M., 278.
Florey, H. W., Wright, R. D., & Jennings, M. A., 303.
Flückinger, G., 286.
Foot, A. S. See Braude, R., et al., jt. authors, 300.
Forbes, J. C., Leach, B. E., & Outhouse, E. L., 305.
*Fóriss, G., 288.
Forsyth, A. A., 291.
Fortner, 275.
Foster, A. O., Christensen, J. F., & Habermann, R. T., 309.
Francis, J., 267.
Francis, T., Jr., 277.
Friedemann, U., Hollander, A., & Tarlov, I. M., 268.
Furth, J., & Barnes, W. A., 295.
Gärtner, H., 317.
Garrod, L. P., 313.
Gates, O. See Warren, S., jt. author, 297.
Geiger, W., 264.
Germany. Contr. bov. Brucellosis, 266.
—. Contr. Rabies, 276.
Gilliland, I. C. See Middleton, S., jt. author, 312.
Glässer, 292.
Glover, R. E., 258.
Glücksmann, A. See Dann, L., et al., jt. authors, 304.
Goldblatt, H. See György, P., jt. author, 302.
Goodner, K., 282.
Graham, R. See Boley, L. E., et al., jt. authors, 310.
—. See also Morrill, C. C., jt. author, 276.
Grau, H., 275.
Graüb, E., Zschökke, W., & Saxer, E., 273.
Greene, H. S. N., 297.
Griffith, A. S., 261, *ter*, 262, *ter*.
Griffith, W. H., 302.
Grossowicz, N. See Kligler, I. J., jt. author, 269.
Grubb, T. C. See Karel, L., et al., jt. authors, 308.
Grüneberg, H. See Engel, S., jt. author, 296.
György, P., & Goldblatt, H., 302.
—, & Rose, C. S., 302.

Habermann, R. T. See Foster, A. O., et al., jt. authors, 309.
Hagan, W. A., 324.
Hailer, E., & Heicken, K., 256.
Hallman, E. T. See Langham, R. F., et al., jt. authors, 300.
Hardy, W. T. See Boughton, I. B., jt. author, 268.
Harms, F., 268.
Hatcher, W. L., 305.
Hawking, F., 313.
Hay, J. R., 255.
Hees, E., 270.
Heicken, K. See Hailer, E., jt. author, 256.
*Heidrich, H. J., 307.
*Hein, 293.
*Hein, K., 277.
Heise, M. D., & Starin, W. A., 256.
*Held, F., 291.
*Hemker, H., 290.
Henderson, H. O. See Vanlandingham, A. H., et al., jt. authors, 255.
Henry, K. M. See Braude, R., et al., jt. authors, 300.
Heynen, K. See Schäfer, W., jt. author, 275.
Hill, D. K., & Pincock, A. C., 318.
Hirt, G., 264.
Hoffman, 319.
Hoffman, F. See Köves, J., jt. author, 286, *bis*.
Hollander, A. See Friedemann, U., et al., jt. authors, 268.
Holmes, W. H., 325.
Howell, C. E., & Britton, J. W., 310.
Hubble, D., 306.
Hudson, R. E. B., 316.
Hughes, A. F. W., & Dann, L., 304.
Hull, F. E., & Taylor, E. L., 292.
Humoller, F. L., Lonert, A. C., & Bottino, C. G., 265.
Hutchings, B. L. See Woolley, D. W., jt. author, 316.

India. Rep. civ. vet Dep., 1939-40, 323.
Israëls, M. C. G., 295.
Ivánovics, G., 257, *bis*.

Jacob, S., 299.
Jahnel, F., 309.
Janeway, C. A. See Cheaver, F. S., jt. author, 297.
Javillier, M., & Emerique-Blum, L., 300.

Jennings, M. A. See Florey, H. W., et al., jt. authors, 303.
Johnson, R. E. See Weirether, F. J., et al., jt. authors, 307.
*Jonckheer, R. See Baldo, J. I., et al., jt. authors, 257.
Jungherr, E. See Weirether, F. J., et al., jt. authors, 307.
Jungleblut, C. W., 285.

Kahn, M. C., 283, *bis*.
*Kaiser, H. G., 266.
Kaplan, I., & Williams, J. W., 269.
Karel, L., Grubb, T. C., & Chapman, C. W., 308.
Karmann, P., 288.
Keller, H., 288.
Kelley, R. B., 320.
Kieliger, F., 299.
Kikuth, W., 310.
Kleckner, A. L. See Klein, L. A., et al., jt. authors, 307.
Klein, L. A., Kleckner, A. L., & Biltz, R. O., 307.
Kliewe, H., 313.
Kligler, I. J., & Grossowicz, N., 269.
Koch, W., & Scherbauer, I., 277.
Köves, J., & Hoffman, F., 286, *bis*.
*—, & Széles, L., 257.
Kon, S. K. See Braude, R., et al., jt. authors, 300.
Konečny, S., 273.
Krause, M. See Schmid, F., jt. author, 311.
Krishnaswamy, A., 320.
Krull, W. H., 287.
Kuehn, A. O. See Pillemer, L., et al., jt. authors, 306.
Kunz, O., 316.
Kuppaswamy, A. R., 270.
Kuwabara, T., 260.

Landsberg, J. W., & Lischer, C. F., 312.
Landsteiner, K., & Chase, M. W., 279, *ter*.
—, & di Somma, A. A., 279, *bis*.
Langham, R. F., Sholl, L. B., & Hallman, E. T., 300.
Langner, 275.
Laporte, R., 261.
Laszlo, D. See Lewisohn, R., et al., jt. authors, 298.
Lawrie, N. R., Moore, T., & Rajagopal, K. R., 300.
Leach, B. E. See Forbes, J. C., et al., jt. authors, 305.
Lecoq, R., 299.
Leiter, L. See Dick, G. F., jt. author, 295.
Lerche, 314.
Leuchtenberger, C. See Lewisohn, R., et al., jt. authors, 298.
Leuchtenberger, R. See Lewisohn, R., et al., jt. authors, 298.
Levine, N. D. See Boley, L. E., et al., jt. authors, 310.
Lewisohn, R., Leuchtenberger, C., Leuchtenberger, R., Laszlo, D., & Bloch, K., 298.
Lillie, R. D., 318.
*Limbeck, L., 279.
Lischer, C. F. See Landsberg, J. W., jt. author, 312.
Live, I. See Stubbs, E. L., et al., jt. authors, 291.
*Ljung, O., 279.
*Lochstedt, H., 278.
Lockau, U., 319.
Lövgren, O. See Carlström, B., et al., jt. authors, 301, *bis*.
Lonert, A. C. See Humoller, F. L., et al., jt. authors, 265.
Loofbourow, J. R., Dwyer, C. M., & Cronin, A. G., 296.
Lotze, J. C., & Yienst, M. J., 272.
Love, W. G. See Stubbs, E. L., et al., jt. authors, 291.
Lührs, E., 282.
Lütje, F., 314.
Luria, S. E. See Exner, F. M., jt. author, 278.
Lush, D. See van den Ende, M., et al., jt. authors, 315.

McCulloch, E. C., 255.
Macdonald, A. J., 320.
McIlwain, H., 309.
McIntosh, C. W., 319.
MacKenzie, I., & Rous, P., 297.
McNutt, S. H. See Trussell, R. E., jt. author, 271.
Maier, J. See Coggeshall, L. T., jt. author, 310.
Malkani, P. G., & Prasad, G., 287.
Mansjoer, M., 292.
Manthei, C. A., & Eichhorn, A., 318.
—. See also Mingle, C. K., jt. author, 267.
*Marcis, A., & Buzna, D., 279.
Martin, G. J., Thompson, M. R., & Accousti, N. J., 312.
Matisheck, P. H. See Tunnicliff, E. A., jt. author, 276.
Mead, T. H. See Braude, R., et al., jt. authors, 300.
*Menasce, I. See Paltrimeri, S., et al., jt. authors, 270.
Menon, K. P. See Shortt, H. E., jt. author, 272.
Mglej, S., 277.
Middleton, S., & Gilliland, I. C., 312.
Miles, A. A., 305.
Minett, F. C. See White, E. G., jt. author, 258.
Mingle, C. K., & Manthei, C. A., 267.
Mócsy, J., 307.
Mohan, B. N. See Mulligan, H. W., et al., jt. authors, 271.
—. See also Russell, P. F., et al., jt. authors, 271.
Moore, E. N. See Vanlandingham, A. H., et al., jt. authors, 255.
Moore, T. See Lawrie, N. R., et al., jt. authors, 300.
Morgan, D. O. See Boddie, G. F., et al., jt. authors, 311.
Morgan, H. R., & Beckwith, T. D., 265.
Moriyama, H., & Ohashi, S., 277.
Morrill, C. C., & Graham, R., 276.
*Muller, A. H., 315.
Mulligan, H. W., Russell, P. F., & Mohan, B. N., 271.
—. See also Russell, P. F., et al., jt. authors, 271.

Neufeld, F., & Bär, F., 313.
Nigg, C., Crowley, J. H., & Wilson, D. E., 282.
*Nikoltscheff, K., 272.
Nordlund, I., 295.

Oerskov, J., 283.
Ohashi, S. See Moriyama, H., jt. author, 277.
Olson, A., 265.
Orlandini, O. See Uhlenhaut, F., et al., jt. authors, 291.
Ostrolenk, M. See Bartram, M. T., et al., jt. authors, 265.
Otto, G. F., 289.
Ottosen, H. E., 273.
Outhouse, E. L. See Forbes, J. C., et al., jt. authors, 305.
Oxford, A. E., 308.
—, Raistrick, H., & Smith, G., 308.

*Paltrimeri, S., Caccarelli, A., & Menasce, I., 270.
*Pana, C. See Daddi, G., jt. author, 261.
Pande, P. G., 270.
*Paraf, J., 262.
Parker, R. F. See Bronson, L. H., jt. author, 285.
Parsons, L. D., & Warren, F. L., 298.
Pavičić, D., 284.
Pepper, D. S. See Sunderman, F. W., et al., jt. authors, 314.
Perlman, H. H., Brown, H., Raiziss, W., & Rule, A., 308.
Petersen, A., 294.
*Petri, K., 260.
Pettersson, A., 283.
Pillemer, L., Seifter, J., Kuehn, A. O., & Ecker, E. E., 306.
Pincock, A. C. See Hill, D. K., jt. author, 318.
Plastridge, W. N. See Weirether, F. J., et al., jt. authors, 307.
Plummer, H., 256.
Porter, D. A., 311.
—, Simms, B. T., & Cauthen, G. E., 311.
Prasad, G. See Malkani, P. G., jt. author, 287.
*Preun, B., 314.
Pschorr, 319.

Quevedo, J. M., 274.

Rahimuddin, M., 273.
Raistrick, H., & Smith, G., 308.
—. See also Oxford, A. E., et al., jt. authors, 308.
Raiziss, W. See Perlman, H. H., et al., jt. authors, 308.
Rajagopal, K. R. See Lawrie, N. R., et al., jt. authors, 300.
Ramini, E. See Castellana, A., jt. author 256.
Ray, S. N., 302.
*Redecha, R., 264.
Reichsgesundheitsblatt, 325.
Risi, A., 266.
Rogers, W. P., 289, 290, *bis*.
Rose, B., 281.
—, & Browne, J. S. L., 281, *bis*.
Rose, C. S. See György, P., jt. author, 302.
Rous, P. See MacKenzie, I., jt. author, 297.
Rule, A. See Perlman, H. H., et al., jt. authors, 308.
Runnels, R. A., & Benbrook, E. A., 296.
Russell, P. F., Mulligan, H. W., & Mohan, B. N., 271.
—. See also Mulligan, H. W., et al., jt. authors, 271.
Ryu, E., 318.

Saco, T. R. See Uhlenhaut, F., et al., jt. authors, 291.
Sahai, L., 316.
Sampson, J., & Boley, L. E., 298.
Sankaranarayan, N. S., 287.
*Sarti, G. See Conti, M., jt. author, 263.
Saxer, E. See Graüb, E., et al., jt. authors, 273.
Saz, A. K., & Bernheim, F., 270.
Schäfer, W., & Heynen, K., 275.
*Schallock, G., 317.
Scherbauer, I. See Koch, W., jt. author, 277.
Schmid, F., & Krause, M., 311.
Schmidt, H., Christian, T. T., & Smotherman, W. M., 306.
*Schneider, L. See Sever, J., jt. author, 264.
*Schneider, P. P., 317.
*Schoop, 293.
Seifter, J. See Pillemer, L., et al., jt. authors, 306.
*Sever, J., & Schneider, L., 264.
Severson, A. S. See Vardiman, P. H., et al., jt. authors, 275.
Sholl, L. B. See Langham, R. F., et al., jt. authors, 300.
Shortt, H. E., & Menon, K. P., 272.
*Sievert, H., 313.
Simms, B. T. See Porter, D. A., et al., jt. authors, 311.
Sjöberg, K. See Carlström, B., et al., jt. authors, 301.
Sjögren, B. See Carlström, B., et al., jt. authors, 301.
Skovbjerg, E., 293.
Sloan, J. E. N. See Boddie, G. F., et al. jt. authors, 311.

Smith, G. See Raistrick, H., jt. author, 308.
—. See also Raistrick, H., et al., jt. authors, 308.
Smotherman, W. M. See Schmidt, H., et al., jt. authors, 306.
*Snapper, I., 318.
Söntgen, K., 263, 314.
Solarino, G., 277.
di Somma, A. A. See Landsteiner, K., jt. author, 279, *bis*.
Southwell, T. See Blacklock, D. B., jt. author, 326.
Spooner, E. T. C. See van den Ende, M., jt. author, 315.
Starin, W. A. See Heise, M. D., jt. author, 256.
Šterk, V., 268.
Stewart, W. L., & Crofton, H. D., 311.
Street, H. R., Cowgill, G. R., & Zimmerman, H. M., 301.
Stubbs, E. L., Love, W. G., & Live, I., 291.
Sunderman, F. W., Pepper, D. S., & Benditt, E., 314.
Sweden. Rep. civ. vet. Serv., 1939, 325.
*Szélyes, L. See Köves, J., jt. author, 257.

Tansley, K. See Dann, L., et al., jt. authors, 304.
Tarlov, I. M. See Friedemann, U., et al., jt. authors, 268.
Taylor, E. L. See Hull, F. E., jt. author, 292.
Tesar, W. C. See Wyckoff, R. W. G., jt. author, 276.
*Thewes, B., 257.
Thomas, J. C., 315.
—, & van den Ende, M., 315.
Thompson, M. R. See Martin, G. J., et al., jt. authors, 312.
Thompson, S. Y. See Braude, R., et al., jt. authors, 300.
*Tobler, J., 272.
du Toit, P. J., 321, 322.
Traub, E., 274, 275.
Trautman, A., & Asher, T., 303.
Trueta, J. See Barnes, J. M., jt. author, 285.
Trussell, R. E., & McNutt, S. H., 271.
Tukalevskiĭ, I. M., 288.
Tulinius, S. See Andersen, T. T., jt. author, 293.
Tunnicliff, E. A., & Matisheck, P. H., 276.
Twort, C. C. See Baker, A. H., jt. author, 315.

Uhlenhaut, F., Saco, T. R., Orlandini, O., and Vasquez, A., 291.
Union South Africa. Rep. Div. vet. Serv., 1938-39, 321; 1939-40, 322.
U.S.A. Rep. Erad. Pullorum Dis. Mass., 1939 & 1940, 264.
—. Rep. N.Y. St. vet. Coll, Cornell, 1936-37, 324.
—. Reps. agric. exp. Stas., 324.

Vaidyanathan, S. N., 288.
Vanlandingham, A. H., Weakley, G. E., Jr., Moore, E. N., & Henderson, H.O., 255.
Vardiman, P. H., Bolin, F. M., & Severson, A. S., 275.
von Vásárhelyi, J., 260.
Vasquez, A. See Uhlenhaut, F., et al., jt. authors, 291.
*Vasquez, D. See Baldo, J. I., et al., jt. authors, 257.
Victor, J. See Earle, D. P., Jr., jt. author, 299.
Videsott, R., 291.

Wadowski, S., 287.
Wahlin, J. G., & Almaden, P. J., 269.
Waisman, H. A., & Elvehjem, C. A., 326.
*Walter, H., 289.
Warren, F. L. See Parsons, L. D., jt. author, 298.
Warren, S., & Gates, O., 297.
Waugh, W. G., 305.
Way, C., 299.
Weakey, C. E., Jr. See Vanlandingham, A. H., et al., jt. authors, 255.
Webster, W. M., 304.
*Weers, E., 257.
Weineck, E., 278, *bis*.
Weirether, F. J., Anderson, E. O., Johnson, R. E., Plastridge, W. N., & Jungherr, E., 307.
Welch, H. See Bartram, M. T., et al., jt. authors, 265.
Westerfield, C. See Errington, B. J., jt. author, 310.
White, E. G., 293.
—, & Minett, F. C., 258.
Whitney, G. D. See Whitney, L. F., jt. authors, 309.
Whitney, L. F., & Whitney, G. D., 309.
*Wicke, K., 293.
*Willenbücher, H., 305.
Williams, J. W. See Kaplan, I., jt. author, 269.
Wilson, D. E. See Nigg, C., et al., jt. authors, 282.
Wolfe, W. R., & Dennis, W. R., 306.
Womack, F. C. See Buddingh, G. J., jt. author, 267.
Woolley, D. W., & Hutchings, B. L., 316.
Wright, R. D. See Florey, H. W., et al., jt. authors, 303.
Wright, W. L. See Boley, L. E., et al., jt. authors, 310.
Wyckoff, R. W. G., & Tesar, W. C., 276.
*Wyssman, E., 263.

Yakub Shah, K. M. See David, J. D., jt. author, 300.
Yanev, E., 272.
Yienst, M. J. See Lotze, J. C., jt. author, 272.
Youmans, G. P. See Colwell, C. A., jt. author, 282.

Zimmerman, H. M. See Street, H. R., et al., jt. authors, 301.
Zschokke, W. See Graüb, E., et al., jt. authors, 273.

NOTE:—In certain cases it is not possible to check references in the original publication. Such references are marked with an asterisk.

Bulletins on disease subjects written for farmers and "popular" articles of a similar nature are not included in the *Veterinary Bulletin*. Those of a sufficiently important nature, are, however, included in *Index Veterinarius*; so also are certain review articles, presidential addresses, congress proceedings, etc., where the title conveys as much information as could be given in an abstract of a few lines. For information of this nature, readers of the *Veterinary Bulletin* are referred to *Index Veterinarius*, where titles of all publications indexed by the bureau are fully cross-referenced.

A list of annotations and reviews, classified according to subject, is now given in *Index Veterinarius*, being inserted at the end of each number. Such papers will not necessarily be dealt with in the *Veterinary Bulletin*.

Review on "Antibacterial Agents derived from Micro-Organisms"

Reprints of this review may be obtained from: Central Sales Branch (Imperial Agricultural Bureaux), Agricultural Research Building, Penglais, Aberystwyth. Price 1/- each.

IMPERIAL BUREAU OF ANIMAL HEALTH

THE

VETERINARY BULLETIN

Vol. 12.] May, 1942. [No. 5.

DISEASES CAUSED BY BACTERIA AND FUNGI

VANLANDINGHAM, A. H., WEAKLEY, C. E., Jr., MOORE, E. N., & HENDERSON, H. O. (1941). **Mastitis. I. The Relationship of the Development of Mastitis to Changes in the Chlorine, Lactose and Casein Number of Milk.**—*J. Dairy Sci.* **24.** 383–398.

These studies were made on 40 pedigree Friesian cows, involving 250 separate udder examinations. The percentages of chlorine, lactose, total nitrogen, and non-casein nitrogen were determined on samples of fore milk from individual quarters.

Fore milk from quarters free from mastitis contained an average of 0·124% Cl with ranges from 0·090–0·224%, and an average of 4·79% lactose ranging from 3·3–5·4%. The chlorine-lactose number varied from 1·62–6·79 with an average of 2·614. The casein number had a range of 69·4–84·3 with an average of 77·57.

Milk from advanced cases of mastitis contained a higher percentage of Cl and a lower percentage of lactose than normal milk. The chlorine-lactose number was higher and the casein number was lower in mastitis milk. Infection usually preceded chemical change in the milk.

These indirect biochemical tests will diagnose chronic mastitis, but they will not detect incipient cases of the condition.—D. L. H.

MCCULLOCH, E. C. (1940). **The Early Detection of Bovine Mastitis by an Electrometric Method.**—*J. Milk Technol.* **3.** 314–319.

The various indirect tests for the detection of mastitis are reviewed and the value of skilled clinical examination is stressed. The portable apparatus here dealt with and the method of employing it has already been described [see *V. B.* **11.** 490]. It is pointed out that the results are known at once and can be correlated with the clinical findings. As in all other indirect tests, high readings are obtained on milk from normal udders immediately following parturition and during the latter stages of lactation. A correction factor for this is provided on the dial. This apparatus gives results which are very similar to those obtained with the chloride test.—JOHN FRANCIS.

HAY, J. R. (1941). **The Bacterial Flora and Disinfection of Teat Cups.**—*Amer. J. vet. Res.* **2.** 297–304.

Observations on a herd of 65 cows, in which mastitis continued to spread in spite of control measures, indicate that the usual method of sterilizing teat cups between each cow, *viz*, rinsing in chlorine solution (50 p.p.m.), is ineffective in removing *Streptococcus agalactiae*. When the teat cups were first rinsed in clean water followed by chlorine solution, the total number of viable organisms cultured from the cups was lower, but this method proved inadequate to free the cups completely from *Str. agalactiae*. If the water and chlorine solution were not changed frequently the numbers of organisms isolated from successive teat cups quickly rose. The treatment of teat cups for 30 sec. with live steam immediately after milking each animal followed by rinsing in chlorine solution proved to be the most efficient method of sterilization. The total bacterial counts were reduced to a minimum and infective organisms (α and α-prime streptococci) were destroyed by this procedure. On the basis of the experimental data it is suggested that teat cups unless properly sterilized may serve as important factors in the spread of bovine mastitis.—N. J. SCORGIE.

BRYAN, C. S. (1941). **A Suggested Program for the Control of Bovine Mastitis in Michigan.**—*Quart. Bull. Mich. agric. Exp. Sta.* **23.** 152–155.

This gives advice on the hygienic control of mastitis following the detection by laboratory methods of infected cows. Milk sample tubes are supplied to farmers who collect the samples and send them for examination at a cost of 10 cents per head. The onus of carrying out the hygienic measures rests on the farmers themselves.—J. E.

PLUMMER, H. (1941). **A Serological and Biochemical Study of Haemolytic Streptococci.**—*J. Immunol.* **42.** 91–107.

A total of 880 strains of streptococci were studied, 180 of which had been isolated from animal and the rest from human sources. Of these strains 96·8% could be placed in groups A to G and no strains belonging to groups H or K were isolated. A small range of biochemical and cultural tests was carried out, and the various groups were divided into serological types by agglutination tests. A table shows the correlation between the designation of subtypes in group B given by STABLEFORTH, and those given by LANCEFIELD. There is a review of the literature on the classification of haemolytic streptococci.—JOHN FRANCIS.

HEISE, M. D., & STARIN, W. A. (1940). **The Effect of Azochloramid on Certain Physiologically Active Products of Staphylococci.**—*J. infect. Dis.* **67.** 70–73.

Various concentrations of azochloramid were incubated for 24 hours at 37°C. with Berkefeld V filtrates of 48–60 hour cultures of *Staph. aureus.* The effects upon the haemolytic, dermonecrotic, and plasma-coagulating activity of the staphylococci were:– (1) A 1 : 990 dilution of azochloramid reduced the haemolytic titre from 1 : 250 to 1 : 40, the highest rate of inactivation occurring during the first 6–8 hours of incubation. (2) The same dilution of azochloramid reduced the dermonecrotic titre in a white rabbit from 1 : 200 to 1 : 10. (3) The plasma-coagulating factor in heated culture was similarly inactivated, but apparently more slowly than the haemolytic power of the unheated culture, while amounts of azochloramid too small to inhibit the growth of cultures appeared to have no effect on the plasma-coagulating substance.—R. O. MUIR.

I. CASTELLANA, A., & RAMINI, E. (1939). Comportamento di animali recettivi al carbonchio (cavie) in confronto di piccole cariche infettanti. [**Behaviour of Susceptible Animals towards Small Infective Doses of Anthrax Bacilli**].—*Boll. Ist. sieroter. Milano.* **18.** 548-558. [German summary].

II. CASTELLANA, A. (1939). Contributo allo studio della vaccinazione della cavia contro il carbonchio con piccole dosi di germi vivi e virulenti. [**Vaccination of G. Pigs against Anthrax by Small Doses of Live, Virulent Organisms**].—*Ibid.* 559–566. [German summary].

I. The authors inoculated g. pigs with small doses of virulent anthrax bacilli. The susceptibility of individuals varied greatly, the fatal dose varying from 1 ml. of a 1 : 10 dilution in some cases to the same dose of a 1 : 5,000 dilution in others. Animals which survived small doses showed no change in the number of red blood corpuscles, in total haemoglobin, or in total white cell count. There was, however, a marked increase in the percentage of polymorphs, notable from the seventh hour after inoculation, and lasting for eight days. An increase in antibodies in the blood of these animals became evident from the eighth day onwards.

II. In g. pigs inoculated with very small doses of live, virulent anthrax bacilli the individual resistance varied greatly. Animals which survived small doses showed, on the whole, increased resistance to larger doses as long as the latter were not too great. Some, however, showed less resistance than control animals.—MILLER WATSON.

HAILER, E., & HEICKEN, K. (1941). Untersuchungen zur Bekämpfung des gewerblichen Milzbrandes: Ueber die Desinfektion von Tierhaaren mit Wasserdampf. [**Control of Industrial Anthrax. Disinfection of Animal Hair by Steam**].—*Zbl. Bakt. I. (Orig.).* **147.** 209–232. [Abst. from authors' summary].

It has been found that the legally prescribed steam disinfection process is insufficient to kill anthrax spores in hair which is matted or is in more or less tight balls. The authors therefore recommend that hair should be disentangled and piled loosely in wire mesh containers before steam sterilization. This in turn would

necessitate the use of protective hoods and masks by personnel preparing hair for sterilization.

*Köves, J., & Szélyes, L. (1940). **[The Value of Anthrax Vaccines]**.—*Közl. Oesszehas. élet.-es kórtan Köreből.* **27.** 325. [Abst. from abst. in *Dtsch. tierärztl. Wschr.* **48.** 296].

The authors found by experiment that no advantage is obtained by introducing saponin into anthrax vaccines; an equally strong immunity was set up by vaccines prepared in the same way as saponin vaccines, but with the saponin omitted. The selection of a good strain for vaccine production is most important. A strain isolated from a carbozoo vaccine and made into a spore vaccine formed an excellent immunizing agent.

Ivánovics, G. (1940). Die immunobiologische Verwandtschaft zwischen dem Anthrax-Polysaccharid, der Pneumokokkus-Typus-XIV-Kapselsubstanz und der spezifischen Substanz der menschlichen roten Blutkörper der Gruppe A. **[Immunobiological Relationship between Anthrax Polysaccharide, Pneumococcus Type XIV Capsular Substance and the Specific Substance of Human Group A Red Blood Corpuscles]**.—*Z. ImmunForsch.* **98.** 373–386.

It is known that all three antigens are related chemically [see *V. B.* **11.** 280]. It was found that horse antiserum to anthrax polysaccharide (but not rabbit antiserum) agglutinated pneumococcus type XIV and precipitated the capsule polysaccharide. Absorption of the serum by pneumococcus did not remove all precipitins for anthrax polysaccharide. The horse antiserum would not react with the human group A specific substance unless it was decomposed by acid hydrolysis.—J. G. Carr.

Ivánovics, G. (1940). Das serologische Verhalten der Abbauprodukte des Anthrax-Polysaccharids. **[The Serological Behaviour of the Decomposition Products of Anthrax Polysaccharide]**.—*Z. ImmunForsch.* **98.** 420–426.

After careful hydrolysis of anthrax polysaccharide with dilute sulphuric acid, several fractions were isolated which would give a precipitate with horse antiserum to anthrax, but not with rabbit antiserum. These fractions inhibited the precipitation of the polysaccharide by rabbit serum, but a mixture of acetylglucosamine and galactose, which are the products of complete hydrolysis, would not do this.—J. G. Carr.

*Baldo, J. I., Jonckheer, R., & Vasquez, D. (1939). Contribución al estudio del problema de la tuberculosis bovina en Venezuela. **[Bovine TB. in Venezuela]**.—*Bol. Minist. san. asist. Soc.* **4.** No. 3. 7. [Abst. from abst. in *Zbl. Bakt. I. (Ref.).* **136.** 287].

Tuberculin tests on 5,607 cattle in the Caracas region resulted in a reaction percentage of 67·5, but in the eastern part of Guarico state only 5·4% of 2,077 cattle reacted. Older cattle were more commonly infected than young ones, although tuberculous lesions were not severe in the animals which were examined. In slaughter cattle at Maracay only 0·19% of 85,908 were found to be tuberculous (observations made mainly in 1935). In Puerto Cabello 0·17% of 22,952 cattle were tuberculous.

*Weers, E. (1939). Untersuchungen über die Formen, unter denen die Tuberkulose beim Rinde auftritt. **[Forms of TB. Found in Slaughter Cattle]**.—*Inaug. Diss., Leipzig.* [Abst. from abst. in *Dtsch. tierärztl. Wschr.* **49.** 89].

In the cases [no figure] examined by W., aerogenic infection was the usual finding, and in 44% of cases the primary focus was in the lungs. In cases of generalization, the lungs were most often involved, in one-quarter of the cases exclusively. Chronic pulmonary TB. was the commonest form of reinfection. Fresh blood infection was observed five times.

*Thewes, B. (1939). Untersuchungen über die Tuberkuloseformen bei Schlachtrindern. **[Forms of TB. Found in Slaughter Cattle]**.—*Inaug. Diss., Leipzig.* [Abst. from abst. in *Dtsch. tierärztl. Wschr.* **49.** 89].

Among 1,840 cattle slaughtered at Cologne abattoir, 520 cases of TB. were found. In most cases there was an incomplete primary complex in the lymph nodes of the lungs. Infection was commonly aerogenic. In cases of early generalization the lungs were most often involved (30·4% of the cases), then the pulmonary pleura (14%), costal pleura (8%), and pericardium (3%).

Of the abdominal organs the liver was the most often affected (15%), then the peritoneum

(12·5%), kidneys (10·5%), and spleen (8·5%). The bones and lymph nodes of the musculature were involved each in about 1% only.

In chronic cases with reinfection the lungs and liver were the most commonly affected (8% and 2% respectively), and the udder was more often affected than the kidneys.

ALLANSON, K. (1941). Iakttagelser vid några fall av vulvatuberkulos hos ko. [**Some Cases of Vulvar TB. in Cows**].—*Skand. VetTidskr.* **31.** 9–14. [English summary].

Three cases of vulvar TB. in cows are described, only two of which, however, were examined in detail. The history, with clinical and other findings, is given. Lesions were confined to the lips of the vulva and the supramammary lymph nodes except that in one case the corpus uteri was involved. The discharge from the lesions contained few tubercle bacilli and these were difficult to demonstrate. A. corroborates PLUM's statement that microscopic examination of excised tissue is the most rapid method of diagnosis.—G. B. BROOK.

WHITE, E. G., & MINETT, F. C. (1941). **The Pathogenesis of Tuberculosis in the Calf.**—*Brit. J. Tuberc.* **35.** 69–87.

Twenty-four calves of 5–7 days old from a tuberculin-tested herd were used in this work. In the first experiment four pairs of calves were used. Two pairs (numbers 1, 2, 3, and 4) received 14 daily doses of raw milk which contained sufficient tubercle bacilli to infect g. pigs, two calves being fed by stomach tube and two from a bucket. The other four calves (numbers 5, 6, 7, and 8) were fed in a similar manner with three half-pint doses of heavily contaminated milk. Two calves (1 and 3) fed on slightly contaminated milk did not develop TB. Calves 2 and 4, fed by bucket and tube respectively, developed caseous pneumonia; infection was attributed to primary aspiration TB. of the mediastinal lymph nodes, which were caseous. Three calves fed on heavily contaminated milk developed TB. Calf 5 (fed by stomach tube) developed TB. of the tonsil and of one Peyer's patch with caseous foci in the associated l.nn. Calf 6 (fed by stomach tube) showed TB. of the lungs and the associated l.nn. Calf 8 (fed by bucket) revealed caseous bronchopneumonia and caseation of the pulmonary and mesenteric l.nn.

In the second experiment, ten calves were anaesthetized and inoculated by the introduction of a culture of tubercle bacilli enclosed in a capsule. The abomasal wall was incised and the capsule was liberated in the duodenum. Three calves died from causes other than TB., and two did not develop gross tuberculous lesions. Of the remainder, three calves developed TB. of the abomasal wound and the mesenteric and hepatic l.nn., one of these also showing miliary TB. of the lungs. The two remaining calves revealed tuberculous Peyer's patches and mesenteric l.nn. In the last experiment, of three calves which were fed on tuberculous milk from a teat bucket, two developed primary alimentary TB. and one showed respiratory lesions. Three calves which were inoculated intratracheally with culture developed lesions at the inoculation sites and in the local and pulmonary l.nn.; tuberculous pneumonia did not develop.—E. C. HULSE.

*FICHTNER, S. (1939). Untersuchungen über die Pathogenese tuberkulöser Veränderungen in der Darmschleimhaut des Rindes. [**Pathogenesis of Tuberculous Changes in the Intestinal Mucous Membrane of Cattle**].—*Inaug Diss., Leipzig.* [Translation of abst. in *Dtsch. tierärztl. Wschr.* **49.** 88].

In 21 out of 56 cases of chronic pulmonary TB. in cattle, tuberculous ulcers were also present in the intestine, and in 33 other cases there was no intestinal tuberculous lesion, but the mucosa was covered by a stiff layer of mucus. F. considered that this may have represented the first stage of TB., but microscopic examination did not support this view. Cases of intestinal lymph node infection were seen in which no tuberculous focus could be found in the intestine; it is suggested that the latter either possessed great resistance or else that a lesion had been present but had healed.

Intestinal ulceration is rare in early generalization. The associated lymph nodes were invariably affected in cases of intestinal TB. TB. was never found microscopically in an intestine which appeared normal macroscopically. The part of the intestine most commonly found to be tuberculous was the ileum and end of the jejunum.

GLOVER, R. E. (1941). **Infection of Adult Cattle with** *Mycobacterium tuberculosis avium.*—*J. Hyg., Camb.* **41.** 290–296.

In the course of an investigation into the

value of the johnin test in cattle [see following abst.], evidence of infection of cattle with *Mycobact. tuberculosis avium* was found in five animals out of 35 examined, while in a further five the autopsy or cultural findings suggested that this type might have been present. In most instances the organism was recovered by the subcutaneous inoculation of g. pigs with suspected material and the culture of the regional lymph node nearest to the point of injection and of the spleen, about one month later.

In five instances avian strains of full virulence for the fowl and rabbit were isolated. In two of these cases the avian organisms were obtained from mesenteric lymph nodes which were not visibly affected, while a strain of standard virulence of the bovine type was recovered from thoracic l.nn. In two further cases avian bacilli were obtained from l.nn. or organs in the abdominal cavity which were not visibly affected, while in one instance trivial lesions were noted in the mesenteric l.nn. In five cases the evidence was incomplete, but the type of lesion at P.M. examination, the nature of the organism isolated, or the reaction to johnin, suggested that the animals might have been infected with *Mycobact. tuberculosis avium.* Clear-cut reactions to johnin were obtained in seven of these cases, one was doubtful, and two were negative.

—. (1941). **Testing Cattle with Johnin. Being a Report on the Value of the Intradermal Test on Cattle by the Agricultural Research Council's Committee on Johne's Disease.**—*J. Hyg., Camb.* **41.** 297–319.

A general introduction on Johne's disease is followed by an account of experimental work by the committee. Comparison between reactions to the double intradermal test with synthetic-medium johnin and tuberculin on 103 cattle, followed by P.M. examination, showed confirmation in 23 out of 69 positive reactors to johnin, or 19 out of 52 if only those reactions are considered about which no disagreement between observers existed. Out of 29 cases which gave negative reactions to johnin, six showed Johne's disease at autopsy, *i.e.* in 23 cases there was agreement. Considering only the 17 cases which were unanimously regarded as negative reactors, 11 were negative at autopsy and six positive. Of the 103 cattle tested, Johne's bacillus was isolated in 20 cases and if consideration is limited to these, 12 reacted positively to johnin and two gave doubtful reactions.

The reasons for the large disagreement between clinical reactions and P.M. findings could not be adequately explained, but failure to detect the infecting bacillus in early or slight cases of the disease probably accounted for some of the negative P.M. findings, while the existence of avian or bovine TB. may have accounted for some unconfirmed positive reactions. Possible imperfections in the two johnins used for testing are also conceded and further research is recommended in the following directions :– (a) regular testing of herds and following up segregated reactors, (b) studying the specificity and accurately estimating the potency of johnin preparations, (c) improving cultural methods for isolating Johne's bacillus, (d) finding a susceptible small laboratory animal through which diagnosis can be improved, and (e) investigating the occurrence of positive reactions to johnin in animals infected with TB., and differentiating avian TB. in cattle.—H. H. Green.

*Enrum, K. H. (1940). Vaerdien af makroskopisk Typebestemmelse af Tuberkulose hos Svin. [**Macroscopic Type Determination in TB. in Swine**].—*Maanedsskr. Dyrlaeg.* **52.** 465. [Abst. from abst. in *Skand. VetTidskr.* **31.** 29–31].

E. describes how the types of TB. encountered in pig carcasses can be recognized by routine macroscopic examination in the abattoir. He postulates that :– (1) avian infection is present if the lesions are confined to the cervical and mesenteric lymph nodes; (2) bovine TB. is the cause if the cervical l.nn. are markedly enlarged and caseated, the caseation being disposed in radial streaks throughout; (3) sarcoma-like tubercles in the liver with softening and enlargement only of the hepatic l.nn. are pathognomonic of avian TB., and (4) all other tuberculous changes are due to bovine type bacilli.

Applying these criteria in 1938, E. traced avian infection to 340 piggeries; slaughter of the stock revealed 1,151 swine with tuberculous lesions of which 91% were avian type and 9% bovine. Similar investigations in 1939 established infection in 210 piggeries with 732 affected pigs (88% avian type and 12% bovine type infections). The diagnoses were con-

trolled by culture tests and it was found that avian type infection had been mistaken for bovine type in 5% of the cases.—G. B. BROOK.

*PETRI, K. (19—). Die Ziegentuberkulose nach pathologischanatomischen Untersuchungen am Schlachthof zu Frankfurt a. M. [**TB. in Goats Seen at Meat Inspection at Frankfurt-on-Main**].—*Inaug. Diss., Giessen.* [Abst. from abst. in *Tierärztl. Rdsch.* **46.** 482].

Forty-five cases (4·9%) of TB. were found among 921 goats slaughtered at Frankfurt-on-Main. In contrast are given figures for Germany as a whole where the TB. percentage in all goats slaughtered between 1920 and 1937 was only 1·02%.

In the Frankfurt cases, the lungs were the commonest site of lesions (45 cases), followed by liver (13), spleen (12), intestine (12), kidneys (5), udder (3), bones (2), and pleura and spinal meninges (1 each). The lymph nodes of the head were tuberculous in 6 cases and those of the trunk in 5 cases.

Typical of TB. in goats is the pronounced encapsulation of infected foci and tubercles and the tendency to softening of caseated lesions.

Pathogenesis is further discussed in the abstract.

*FERRONI, P. (1940). Un caso di sepsi tubercolare nel cane. [**Tuberculous Septicaemia in a Dog**].—*Tubercolosi.* **32.** 179. [Abst. in *Amer. Rev. Tuberc.* **44.** p. 83 of absts., copied *verbatim.* Signed: S. L.]

Tuberculosis of domestic animals, especially of dogs, is revealed by a review of the literature (1852 to the present) to be much more diffused than is supposed. Tuberculosis in the dog is usually contracted from human sources and presents all clinical variations and initial diagnostic difficulties of the disease in man. However, no case of septicaemia has ever been reported, nor has any experimental work been done. This condition was observed by Ferroni in a three year old greyhound, who died of an acute illness. The animal had been listless for about three weeks, gradually developing complete anorexia, diarrhoea and marked loss of weight. High fever, rapid pulse and respiration were noted, together with abdominal tenderness and evidence of pain on voluntary motion. Although the clinical findings pointed to a diagnosis of septicaemia, no organisms were isolated on blood cultures. At autopsy spleen and liver were enlarged; numerous miliary nodules were found in the kidneys and liver; the right heart was hypertrophic. Histological examination of the different organs failed to show giant cells—usually rare or absent in tuberculosis of the dog—and true epithelioid tissue; but acid-fast bacilli were found on smears of material from liver, spleen and kidneys. Cultures of the same material, as well as of blood taken from the heart chambers, showed luxuriant growth on Petragnani's medium in fifteen to twenty days. As a further proof, material from the liver was inoculated in 2 guinea pigs, causing their death from tuberculosis in twenty days; while other g. pigs inoculated with blood from the heart chambers died in forty days, also showing tuberculous infection at autopsy. A chicken was inoculated with material from the liver, but when it died from an intercurrent infection in four months, repeated cultural examinations were consistently negative for tubercle bacilli. In substance, therefore, the macroscopical and microscopical findings, as well as cultural, were those of a true acute generalized tuberculous septicaemia, probably primary in the liver. The human type of tubercle bacillus was thought to be the causative agent of this very unusual condition in a dog.

KUWABARA, T. (1940). **On the Susceptibility of Cats to Tubercle Bacillus. Part 3.**—*Kitasato Arch. exp. Med.* **17.** pp. 8–9 of absts. [In English]. [For previous parts, see *V. B.* **9.** 519, and **11.** 280].

It is stated that in normal cats phagocytosis of the human type of tubercle bacillus is very marked. The tuberculin reaction in cats injected intravenously with 5 mg. of human type bacilli was negative. Histological changes were present in the cats one month after injection of human type bacilli.—N. J. S.

VON VÁSÁRHELYI, J. (1940). Die Rolle des bovinen Typus bei der Entstehung der Meningitis tuberculosa. [**The Role of the Bovine Type Tubercle Bacillus in Tuberculous Meningitis in Man**].—*Zbl. Bakt. I. (Orig.).* **146.** 195–199.

The bovine type of tubercle bacillus was identified in six (12·5%) of 48 cases of tuberculous meningitis.—J. E.

GRIFFITH, A. S. (1941). **Atypical Strains of Tubercle Bacilli in Human Tuberculosis.** —*J. Hyg., Camb.* **41.** 272–283.

The cultural characters, frequency, and regional distribution of several dysgonic human strains are described. The importance of using agar, potato, or broth containing glycerol as differential media is stressed, since many of these strains on subcultivation grow luxuriantly on plain or glycerol egg and are, therefore, indistinguishable from eugonic human bacilli. It is noted, however, that even after prolonged cultivation on glycerol egg (25 years in one instance) these organisms are still dysgonic when transferred to glycerol potato. The difference between egg and potato is ascribed to the probability that on egg medium the organism can grow without utilizing the glycerol, whereas, on potato, multiplication can only proceed when the metabolic activity is quickly altered to enable the organism to attack glycerol.

A description is given of two anomalous human strains, one of which was dysgonic and of the bovine type in cultures but produced lesions similar to those ascribed to the human type in goats, rabbits, and g. pigs, although when tested on voles it was more characteristic of a bovine type: the second yielded a eugonic culture the pathogenic effects of which were more severe than those of typical human bacilli. The reactions in g. pigs, rabbits, and voles are given.—R. E. GLOVER.

*DADDI, G., & PANÀ, C. (1939). La diffusione ed il destino dei bacilli di Koch in rapporto ad loro stato di dispersione. Nota II. [**The Spread and Fate of Tubercle Bacilli in the Body in Relation to their State of Dispersion. II**].—*Ann. Ist. Carlo Forlanini.* **3.** 845. [Abst. in *Tubercle, Lond.* **21.** 246, copied *verbatim*]. [For part I, see *V. B.* **11.** 666].

The authors injected finely dispersed suspensions of virulent tubercle bacilli into the left ventricle and mesentery of guinea-pigs, and after killing the animals at intervals of one, two, fifteen, twenty-four, forty-eight, and seventy-two hours after injection, found histological signs of early reaction in the liver, kidneys, and lungs which was greater than that obtained in control animals inoculated with less fine suspensions. The experiment shows that the hepatic filter forms an important barrier to microbic emboli.

GRIFFITH, A. S. (1941). **A Method of Preserving a Strain of the Tubercle Bacillus without Having Recourse to Successive Subcultivation or Injection of the Usual Laboratory Animals.**—*J. Hyg., Camb.* **41.** 289.

Various types of *Mycobact. tuberculosis* disseminate in the toad without producing visible lesions. Strains can be recovered in culture after long periods without their undergoing apparent modification: for example, bovine type bacilli have been isolated from the liver up to three years after subcutaneous injection.—R. E. GLOVER.

LAPORTE, R. (1941). Sur la substance non acidorésistante des cultures de bacilles tuberculeux. [**The Non-Acid-Fast Substance of Cultures of Tubercle Bacilli**]. —*C. R. Acad. Sci., Paris.* **212.** 138–140.

A technique is described for the almost complete separation of non-acid-fast substance from the bodies of tubercle bacilli in cultures. The substance, referred to as cyanophile, is Gram negative. Heat-sterilized cyanophile material has the same antigenic properties as whole dead bacilli. It sensitized g. pigs to tubercle bacilli and allergic animals reacted to it in the same way as to whole culture filtrate. Production of active antibody followed its inoculation into rabbits. It is an active antigen in the complement-fixation test for tuberculosis antibody, but is not agglutinated by antisera.

Increased amounts of this substance are progressively released in cultures maintained for a length of time at 37°C. In view of this, and of its biological properties, L. concludes that it is composed of bacterial fragments, the product of bacteria undergoing a lytic process in which their normal morphology is destroyed. The possible effects of such a breakdown's occurring *in vivo* are referred to.

GRIFFITH, A. S. (1941). **The Survival of the Calmette-Guérin Strain of Tubercle Bacillus (B.C.G.) in the Blood and Mamma of Goats.**—*J. Hyg., Camb.* **41.** 266–271.

A goat injected intravenously with 10 mg. of BCG culture was bled at intervals of 1–1½ min., 24 hours, 48 hours, 72 hours, and so on. Centrifuged deposits from citrated samples were sown on Löwenstein's medium. The

injections of cultures were repeated at intervals of 3–5 months. The results were very irregular since only a few colonies were recovered after 24 hours and practically none after the fourth day. There was no evidence that disappearance from the bloodstream was more rapid after secondary than after primary inoculation. The organisms did not pass to the immature mamma.

The intramammary injection of BCG in two goats induced a febrile response followed by a pronounced local inflammatory reaction in which the teat canal and milk cistern became filled with serous fluid and caseous pus. Although the changes produced lasted until the animals were killed (two years and three years later respectively) the organisms disappeared at an early stage and were not recoverable, in one instance, after about 15 weeks.—R. E. GLOVER.

*PARAF, J. (1940). Indications et technique de la vaccination par le BCG. [**BCG Vaccination**].—*Progr. méd.* **68.** 21. [Abst. from abst. in *Amer. Rev. Tuberc.* **43.** p. 79 of absts. Signed: H. R. N.]

Clinical and experimental studies during the last 15 years have now made it possible to form certain definite conclusions regarding vaccination with BCG. Vaccination with BCG is absolutely harmless. All harmful clinical results, such as the Lübeck disaster, have been proved to have been the result of accident. Moreover, it has been impossible, experimentally, to convert BCG into a virulent organism. The efficacy of BCG has been demonstrated without question. Experimentally, it has been possible to protect cattle, monkeys, and rabbits against a virulent inoculation of tubercle bacilli. In the g. pig, the survival time has been prolonged and the infection takes a different course with the formation of pulmonary cavities. The immunity conferred by the BCG vaccination is only relative and is rather weak; it is in no way comparable to the immunity conferred by inoculation for diphtheria or tetanus. While vaccination can undoubtedly be carried out by the oral route, the parenteral method is more exact and more successful. P. prefers the scarification method. Individuals who do not develop a positive tuberculin reaction should be revaccinated.

I. GRIFFITH, A. S. (1941). **Further Experiments on the Field Vole with Tubercle Bacilli.**—*J. Hyg., Camb.* **41.** 250–259.

II. GRIFFITH, A. S. (1941). **Further Experiments on the Golden Hamster (*Cricetus auratus*) with Tubercle Bacilli and the Vole Strain of Acid-Fast Bacillus (Wells).**—*Ibid.* 260–265.

III. GRIFFITH, A. S. (1941). **The Susceptibility of the Water (or Grass) Snake (*Trepidonotus natrix*) to the Avian Tubercle Bacillus and to Reptilian Strains of Acid-Fast Bacilli.**—*Ibid.* 284–288.

I. The vole was used in an attempt to differentiate bovine and human types of tubercle bacilli, using cultures of standard virulence for the rabbit and g. pig, together with strains which were atypical. Bovine strains caused a rapidly fatal, progressive TB. accompanied by great multiplication of bacilli, whereas human strains rarely provoked visible lesions [see also WELLS—*V. B.* **9.** 520, and BROOKE—*V. B.* **9.** 200].

It was not possible to distinguish dysgonic from eugonic human types, whilst attenuated bovine strains were closer to the bovine type in their effects.

A number of strains isolated in Nigeria, which were apparently of the human type in respect of cultural characters and in the reactions which they produced in rabbits and g. pigs, differed widely in their effects on the vole.

II. Hamsters were tested by subcutaneous inoculation and by the feeding of bovine, human, avian, and vole types of tubercle bacilli. The human strains produced generalized lesions when injected, but only slight changes or no lesions after feeding: the bovine strains, on the other hand, induced generalized lesions when given by the mouth. The avian bacilli were less virulent, although the organisms multiplied profusely in the organs. The vole bacillus gave rise to widespread lesions which were essentially epithelioid in character, without caseation or necrosis. They developed very slowly, 305 days in one instance, after subcutaneous injection of 1 mg.

III. Cultures of acid-fast bacilli obtained from snakes which died in captivity were compared with avian bacilli. The snake strains resembled avian strains only in their slimy cultural character and in their ability to produce joint lesions in rabbits. They were differenti-

ated by agglutinin absorption tests and by the injection of chickens which were refractory to snake bacilli.

The grass snake was highly susceptible to subcutaneous injection of fully virulent avian bacilli and to some of the snake strains. The possibility of using the grass snake to differentiate pathogenic from saprophytic acid-fast reptilian bacilli is discussed.—R. E. GLOVER.

*WYSSMAN, E. (1940). Rotlauf bei neugeborenen Ferkeln. **[Swine Erysipelas in Newborn Piglets]**.—*Schweiz. Arch. Tierheilk.* **82.** 428–431. [Abst. from abst. in *Dtsch. tierärztl. Wschr.* **49.** 113].

A discussion upon whether swine erysipelas can occur in piglets as a result of intra-uterine infection. From a survey of the literature and as a result of his own experiences, W. concludes that it does.

*BRANDT, H. (1938). Hämoglobinophile Bakterien im Respirationstraktus von Menschen und Schweinen mit vergleichenden Studien über das Pfeiffer'sche, Shope'sche und Köbe'sche Influenzabakterium. **[Haemoglobinophile Bacteria in the Respiratory Tract of Men and Swine with Comparative Considerations of** *Haemophilus influenzae***]**.—*Inaug. Diss., Hanover.* [Abst. from abst. in *Zbl. Bakt. I. (Ref.).* **136.** 215].

H. influenzae suis was isolated from the nasal passages of 14 out of 100 healthy pigs. Bacteria indistinguishable from these were similarly recovered from healthy persons. Both grew in an identical manner on culture media, requiring the presence of X and V factors and the absence of a thermolabile inhibitory factor which is present in horse serum. Only two of seven strains from man were able to produce indole.

The porcine strains were pathogenic for mice directly after isolation, but not after 18–19 culture passages. Some of the porcine strains were also pathogenic for rabbits. Tests on mice and rabbits gave no evidence of the formation of a toxic metabolic product by three strains so tested.

Agglutination tests revealed disunity among the strains, but attempts failed to divide the strains into distinct groups on morphological, biological, or serological grounds.

CERRUTI, C. G. (1939). Sul'azione della saponina sulle Pasteurelle ed in modo particolare su Pasteurella bubaliseptica. **[Action of Saponin on Pasteurella]**.—*Clin. vet., Milano.* **62.** 417–420.

Using five strains of *Past. bubaliseptica* and two strains of *Past. boviseptica*, C. studied the effect of saponin on their viability. 3% and 5% saponin were added to suspensions of the bacteria and no lysis was observed in 15 days at room temperature. For 30 days after that broth subcultures were made from the suspension containing saponin and normal growth of morphologically normal bacteria was obtained. Rabbits inoculated with bacterial suspensions containing 3% and 5% saponin succumbed as quickly as the control animals.

C. concludes that saponized vaccines of pasteurella are unlikely to be useful.—M. W.

SÖNTGEN, K. (1941). Die Feststellung einer Paratyphus-abortus-equi Infektion in einem Bestande ohne Zuchtbetrieb. **[Confirmation of a** *Salmonella abortus-equi* **Infection in Non-Breeding Horses]**. —*Berl. Münch. tierärztl. Wschr.* July 4th. 324–326.

S. abortus-equi was recovered from eight slaughtered army horses (five geldings and three mares) in the course of two months. These horses came from one isolated division of a military hospital and were slaughtered after failure to recover effectively from pneumonia or strangles. Horses from other divisions of the hospital were not infected and the infection in the one division died out progressively, for while *S. abortus-equi* was recovered from musculature, lymph nodes and all organs of the first horse to be affected, it could only be recovered from the liver in the last and the numbers of colonies on plates diminished with each of the eight successive cases. No attempt was made to isolate salmonella from the gut or urogenital system. These horses were infected despite there being no opportunity for breeding.

S. also describes six other cases which had occurred in the previous autumn, from which *S. abortus-equi* was isolated. In no instance could the organism be isolated from the faeces but it was isolated from the urine of one horse with a blood titre of 1 : 3,200.—D. L. ROBARTS.

*CONTI, M., & SARTI, G. (1940). Le salmonelle nel contenuto intestinale di animali sani da macello. **[Salmonella in the**

Intestinal Contents of Healthy Slaughter Animals].—*Boll. Ist. sieroter. Milano.* **19.** 338–347. [Abst. from abst. in *Zbl. Bakt. I. (Ref.).* **140.** 60].

The authors first determined that salmonella organisms were more common in the large than in the small intestines of healthy animals. They were isolated from the caecal contents of 18 out of 247 animals examined. They were present in 4% of cattle, 3% of swine and 23·4% of horses examined.

*Sever, J., & Schneider, L. (1940). [**Porcine Paratyphoid with Special Reference to the Voldagsen Type**].—*Közl. Oesszehas. élet- es kórtan Köreből.* **27.** 337. [Abst. from abst. in *Dtsch. tierärztl. Wschr.* **48.** 296].

In the authors' experience, the organism they speak of as the Voldagsen type of *Salmonella suipestifer* is undoubtedly capable of causing disease on its own account, whilst the organism they refer to as the Kunzendorf type is incapable of so doing, unless the pig has been previously attacked by swine fever virus or has been weakened by malnutrition, etc.

[It is to be noted that in this paper and generally by German authors, these two varieties are spoken of as *S. suipestifer*. The Salmonella Subcommittee of the Nomenclature Committee of the International Society for Microbiology (see *V. B.* **5.** 63.) recognizes two types of the swine fever bacillus, one being called *S. cholerae-suis* and the other *S. cholerae-suis* var. *kunzendorf*, and two other pig paratyphoid organisms, *S. typhi-suis* and *S. typhi-suis* var. *voldagsen*.—Ed.]

Geiger, W. (1940). Enteritis-Infektion der Schweine. [**Salmonella Infection in Swine**].—*Dtsch. tierärztl. Wschr.* **48.** 189–191.

G. discusses enteritis in pigs in Germany and maintains that the Voldagsen and Kunzendorf organisms cause readily differentiated diseases, the former producing characteristic ulcers with a tendency to caseation of the lymph nodes and the latter a more acute disease. [See note on preceding abst. concerning nomenclature of these organisms.] Several outbreaks of swine paratyphoid investigated are described; healthy pigs were inoculated with filtered blood or extract of organs of the affected pigs to exclude the possibility of their being infected with swine fever. The results of this work are detailed. Emphasis is laid on unfavourable environmental factors, such as damp cold houses and on diseases such as piglet influenza which predispose to paratyphoid infections.—D. L. Robarts.

Hirt, G. (1941). Pathologisch-anatomische Veränderungen beim Schweineparatyphus vom Typ Voldagsen. [**Pathological Changes in Pig Paratyphoid**].—*Berl. Münch. tierärztl. Wschr.* August 8th. 383–386.

The pathological changes in swine paratyphoid as caused by the Kunzendorf and Voldagsen organisms are described. H. states that whereas the former type usually causes acute infection, the latter usually causes subacute or chronic disease. The Voldagsen type causes changes especially in the large intestine and associated lymph nodes and rarely in the ileum or lungs. [See note on nomenclature of these organisms in abst. of Sever & Schneider, above.]—D. L. Robarts.

*Redecha, R. (1941). [**The Occurrence of *Salmonella cholerae-suis* in the Faeces, Ileo-Caecal Valve, and in the Bile of Swine**].—*Közl. Oesszehas. élet- es kórtan Köreből.* **29.** 299. [Abst. from abst. in *Dtsch. tierärztl. Wschr.* **49.** 372].

Examination of 298 animals showed that the faeces of pigs which harbour *S. cholerae-suis* in the intestines (samples from ileo-caecal valve) are not always infected; thus faecal examination is an unreliable indication of infection. [No separate data are given in the abstract on the infection of bile].

—. (1939). **Nineteenth Annual Report on Eradication of Pullorum Disease in Massachusetts by the Poultry Disease Control Laboratory.**—*Control Bull. Mass. agric. Exp. Sta.* No. 98. pp. 12.

—. (1940). **Twentieth Annual Report on Eradication of Pullorum Disease in Massachusetts by the Poultry Disease Control Laboratory.**—*Ibid.* No. 103. pp. 13.

The results reported in these two bulletins show continued progress in the eradication of the disease in Massachusetts. There was a continued increase in the number of tests carried out each year, and in 1939–40 only 0·51% reactors were disclosed in a total of 673,222 samples tested. In all, 346 flocks were tested and 332 contained no reactors, an

increase of 5% on the number of non-reactor flocks found in 1938–39.

The great progress made during the 20 years in which the eradication scheme has been in operation is well illustrated by the fact that the percentage of the total tested birds which occur in non-reactor flocks, has increased from 9·77% in 1920–21 to 86·79% in 1939–40.

The detection of infection in flocks previously negative indicates the necessity of annual testing. The results also show that intermittently tested flocks (at intervals longer than a year) show a higher incidence of infection than flocks tested annually, while flocks tested for three or more consecutive years show a corresponding decrease in the percentage of reactors. The necessity of testing all birds on a premises is also illustrated. There was also an increase in the number of turkey flocks tested.—R. F. GORDON.

BARTRAM, M. T., WELCH, H., & OSTROLENK, M. (1940). **Incidence of Members of the Salmonella Group in Rats.**—*J. infect. Dis.* **67.** 222–226.

Feeding by stomach tube of massive doses of *S. enteritidis* on six successive days to rats usually resulted in rapidly fatal infection. Single doses of 100–100,000 resulted in persistent infection, particularly with the smaller doses, and a large proportion of such rats excreted the organism in the faeces intermittently from the first days, even up to seven weeks in a few cases. Natural transmission to cage mates was also demonstrated through six rat colonies in succession. High agglutinin titres were found up to four months after infection. Examination of faeces from 800 domestic rats and agglutination testing in 26 failed to reveal the presence of salmonella. —A. W. STABLEFORTH.

MORGAN, H. R., & BECKWITH, T. D. (1939). **Mucoid Dissociation in the Colon-Typhoid-Salmonella Group.**—*J. infect. Dis.* **65.** 113–124.

Investigation of the influence of incubation temperature upon the mucoid dissociation of 12 *Bacterium coli* strains, two *Salmonella typhi* strains and seven other *Salmonella* species in the presence of 1% glucose, and of the effect of a variety of carbohydrates upon the mucoid variation of five *Bact. coli* strains, demonstrated that, although a relatively low temperature (10°–20°C.) induced mucoid dissociation, not all strains produced mucoid variants with equal facility, that the mucoid form was maintained only by storage at similar temperatures, and that the presence of a carbohydrate readily available to the particular strain was essential, as the substitution of diverse carbohydrates for glucose gave positive results unobtained with such a substitute as ammonium lactate. A comparative study of the physical and serological properties of mucoid, smooth, and intermediate variants of *Bact. coli* showed that the mucoid variant was more resistant to desiccation, equally resistant to germicides, inagglutinable by mucoid or non-mucoid antisera, produced capsular material which gave positive precipitation with mucoid and non-mucoid antisera, and yielded positive skin reactions when injected intradermally into rabbits immunized with any of the three variants. The capsular polysaccharide complexes of different *Bact. coli* strains were shown to differ antigenically, each being independent of the configuration of the carbohydrate from which it was formed.—R. O. MUIR.

HUMOLLER, F. L., LONERT, A. C., & BOTTINO, C. G. (1939). **The Preparation of an Antigenic Toxin from Salmonella enteritidis.**—*J. infect. Dis.* **65.** 206–213.

A detailed account is given of a convenient method of preparing relatively large amounts of an antigenic endotoxin from *S. enteritidis* grown in broth, broth diffusate, and a synthetic phosphate-acetate medium. The endotoxic fraction was most easily isolated and in the largest amounts from the diffusate medium. Repeated subcutaneous injection of this toxin in sublethal doses into groups of 21–25 mice induced a slight but definite immunity to lethal intravenous and intraperitoneal doses of toxin and of live culture. Injection of minute amounts of toxin into rabbits by an unspecified route produced a pronounced hyperglycaemia and leucopenia. The chemical and biological properties of the endotoxin were found to resemble those of certain fractions obtained by other workers from related organisms grown on solid media.—R. O. MUIR.

OLSON, A. (1941). Om värdet av den Köster'ska färgningsmetoden vid diagnostiken av Brucella abortus. [**Value of Köster's Staining Method for** *Br. abortus*].—*Svensk VetTidskr.* **46.** 69–76.

O. compared microscopic examination of

smears stained by KÖSTER's method [*V. B.* **7.** 321.] with the g. pig method in the examination of 232 samples of bovine placenta for the demonstration of *Br. abortus*. The results were practically identical. O. therefore suggests that the microscopic method of diagnosis is reliable for the examination of placental material.

—J. E.

—. (1941). Deutsches Reich. Runderlass des Reichsministers des Innern, betr. Bekämpfung des seuchenhaften Verkalbens (Banginfektion des Rindes); Ausnahmen von dem Verbot der Impfung mit lebenden Erregern der Banginfektion. [**Germany: Circular on the Control of Bovine Brucellosis: Exceptions to the Prohibition of Use of Live Vaccines**].—*Reichsgesundheitsblatt.* **16.** 566–567.

An exception to the prohibition of the use of live vaccines has been made, partly owing to the stimulus of war conditions, in favour of the Behringwerke bile culture vaccine [no details], which is now allowed to be used on non-pregnant cattle in heavily infected and in freshly infected herds. The exact procedure is laid down in this circular. Official district veterinarians have to supervise the work in co-operation with the veterinary *Untersuchungsämter*, which carry out the necessary diagnostic examinations.—J. E.

*KAISER, H. G. (1940). Tenazität und Chemoresistenz der Bangbakterien. [**Tenacity and Resistance to Chemicals of** *Brucella abortus*].—*Inaug. Diss., Hanover.* [Abst. from abst. in *Berl. Münch. tierärztl. Wschr.* Sept. 26th. 474. (1941)].

The legally prescribed disinfectants, *viz*, milk of lime, bleaching powder, cresol, phenol, cresol sulphuric acid, corrosive sublimate, formalin, caporit [a hypochlorite preparation], chloramin and caustic soda, were all effective within 30 min., either on pure culture or on infected threads. Some new proprietary disinfectants, *viz*, "zephirol", "sagrotan", "baktol" and "valvanol", were equally good. Tincture of iodine and its [bromine] substitutes "dibromol" and "sepsotinktur" were all lethal within 10 min.

With regard to the question of transmission of brucellosis by foot and mouth disease convalescent serum, K. found that brucella may remain alive in such unpreserved serum for 13 days and for five days in such serum when carbolized. In centrifuged and carbolized serum, brucella were still alive at the third day. These results indicate the need for preserving F. & M. disease antiserum by chemical means and storing it for about a week before use.

RISI, A. (1938). Experimentelle Brucellose und endovenöse Vaccinebehandlung. [**Experimental** *Br. melitensis* **Infection in Animals and Intravenous Curative Vaccination**].—*Z. ges. exp. Med.* **104.** 95–104.

Three groups of 12 g. pigs were inoculated with suspensions of live *Br. melitensis*, group I into the pleura, group II intraspinally, and group III intraperitoneally. After the onset of febrile symptoms, six g. pigs from each group were vaccinated intravenously, three with a commercial stock vaccine and three with vaccine prepared from the strain used for the infective dose [presumably killed]. Gradually increasing doses were given at two-day intervals. The homologous vaccine produced a pronounced febrile reaction with a decrease in agglutination titre, followed after a few days by a return to a normal temperature and an increased aggln. titre. The organism could occasionally be isolated from the urine but seldom from the circulating blood. The results with the stock vaccines were less favourable than with the other vaccines. The remainder of the g. pigs were observed and later killed and autopsied. Inoculation into the pleura produced pleurisy together with the general changes associated with *Br. melitensis* septicaemia. Intraspinal inoculation did not give rise to meningitis or to local lesions; general symptoms were comparatively slight. Intraperitoneal inoculation always led after a long period to an acute septicaemia.

R. claims that, in the treatment of human brucellosis, intravenous autogenous vaccination has given the most outstanding results of any method, being rapid in action and unattended by toxic or fatal complications. No statistics are offered. It is claimed that the earlier the treatment is introduced the more favourable its effect. It is said to act by first producing an intense allergic reaction with rapid desensitization, and that the stimulation of the specific immunity reactions follows afterwards to consolidate the cure; an intense febrile reaction is necessary and this is followed by rapid

recovery. To produce the best results in this "shock therapy" the vaccine must be strictly specific.—H. E. HARBOUR.

MINGLE, C. K., & MANTHEI, C. A. (1941). **Bacterial Dissociation in Brucella Abortus.**—*Amer. J. vet. Res.* **2.** 181–189.

Variants of strain 19, commonly used in the U.S.A. for protective vaccination of cattle, have been studied. The variants of this strain observed may be divided into three main groups, *viz*, the smooth (S), usually virulent; the rough (R) or terminal dissociant, typified by loss of virulence, changes in morphology, and of altered antigenic power, and intermediate forms whose characters fall between the S and R forms. Examination of a vaccine which had given anomalous results in the field revealed an unusual dissociant form (W) differing from common brucella variants in its colonial and cellular morphology. Similar variants were obtained from old vaccines.

These forms were compared with the stock strain 19 and with a virulent *Br. abortus* strain. The variants showed a typical colonial form but resembled the S forms in their inability to ferment test carbohydrates. They were, however, able to tolerate the dyes commonly used in differentiating members of the brucella group, while irregularities in the production of hydrogen sulphide were observed. Serological experiments showed distinct antigenic differences, although the parent form had a residual antigen common to the dissociants. No absorbing capacity was possessed by an antigen prepared from the heterologous S strain. Reversion of the W form to the S form was readily accomplished by passage through g. pigs, the recovered S strain being identical with the strain 19. The authors stress the importance of strict control in the preparation of live brucella vaccines.—K. C. SELLERS.

BUDDINGH, G. J., & WOMACK, F. C., Jr. (1941). **Observations on the Infection of Chick Embryos with *Bacterium tularense*, *Brucella*, and *Pasteurella pestis*.** —*J. exp. Med.* **74.** 213–222.

Cultures of the above organisms were inoculated on to the chorio-allantois of 12-day-old chick embryos. The embryos were fixed at 24 hour intervals following inoculation, sections cut, and the multiplication of micro-organisms and the cellular changes studied.

Bact. tularense, *Br. abortus*, *Br. suis*, and *Br. melitensis* exhibited varying degrees of facultative intracellular parasitism, but *Past. pestis* proliferated and spread rapidly in the intercellular fluids. *Bact. tularense* and the brucella apparently depend for their survival and increase during the early stages of infection upon their capacity for intracellular growth. The same capacity may account for the chronicity of infections caused by these bacilli because it is generally recognized that the intracellular environment is little affected by immune bodies.

Forty-eight hours following the inoculation of *Br. suis*, a moderate cellular exudate consisting of a few polymorphonuclears and numerous mononuclears was observed in the mesoderm directly beneath the ectodermal cells. Mononuclear and occasional epithelial cells became greatly distended with bacilli. After 72–96 hours endothelial cells of the blood vessels became heavily infected, many of them burst, and there were numerous haemorrhages. Bacilli also multiplied extensively in mesodermal cells but the entoderm was not invaded. Focal areas of necrosis were found in the liver, spleen, kidney, and myocardium.

Br. abortus had a greater tendency to invade the mononuclear and fibroblast cells of the mesoderm. The invasion of the vascular endothelium was less severe but infection spread to the embryo by this route. Focal necrosis occurred as with *Br. suis*.

Br. melitensis proliferated more rapidly and produced much more inflammatory reactions than the other two species of *Brucella*. There was, however, less tendency for invasion of the mesoderm and the vascular endothelium was not invaded. Positive heart-blood cultures were obtained but no focal lesions or intracellular bacilli were observed in the organs of the embryo. *Br. suis* usually killed the embryo within 72–96 hours, whilst with the other two species of *Brucella* survival was slightly longer. —JOHN FRANCIS.

FRANCIS, J. (1941). **A Bacteriological Examination of Bovine Tonsils and Vaginas. The Possible Relationship of the Findings to Mastitis and Pneumonia.**—*Vet. J.* **97.** 243–251.

Bacteriological examinations were made of 100 pairs of bovine tonsils within 12–48 hours of slaughter of the animals, and of vaginal swabs taken from 48 dairy cows. *Streptococcus agalactiae* was not isolated, but Minett's group

II and group III and Lancefield's group C streptococci were isolated six, eight, and nine times respectively. Six strains of an enterococcus and one of *Str. salivarius* from the tonsils and 15 strains of *Str. acidominimus* from the vaginas were determined among 125 diverse strains of streptococci isolated. The other predominant organisms were Gram-negative coliform types. *Corynebacterium pyogenes* was found in 18 tonsils and one vagina. *Staphylococcus aureus* was found associated with *C. pyogenes* in three tonsils. A pasteurella-like " haemolytic coccobacillus " was isolated from six tonsils.

F. discusses these findings in relation to their possible role in outbreaks of the essentially sporadic forms of mastitis and calf pneumonias which other workers have thought may have an endogenous development.—C. V. WATKINS.

ŠTERK, V. (1939). Laboratorijska diagnostika plinovitog edema domaćih životinja na području Južne Srbije s osobitim obzirom na izvorni materijal i biološki opit. **[Laboratory Diagnosis of Anaerobic Infection of Domestic Animals in Southern Serbia]**.—*Vet. Arhiv.* **9.** 366–381. [English summary].

A series of laboratory studies was made with materials obtained from cattle, sheep, goats, and horses, which had succumbed to infections with anaerobic organisms in Southern Serbia, Yugoslavia.

The following conclusions can be drawn from the results obtained :– (1) *Clostridium chauvoei*, *Cl. septique*, and *Cl. welchii* are involved in anaerobic infections of domestic animals in Southern Serbia. (2) *Cl. chauvoei* is the only organism which can be diagnosed by microscopic inspection alone ; for the others, a laboratory test is also required. (3) The production of long threads of *Cl. septique* takes place, not only on the surface of serous membranes, but also inside the organs, provided that the material is more than 24 hours old and that it has been kept away from warmth. (4) A negative g. pig inoculation test does not necessarily suggest that the inoculum was free from any pathogenic organisms. Subcutaneous administration is not a satisfactory method of inoculation. A very expressive so-called " Zeissler's finding I " is regularly met with in cases of infection caused by *Cl. welchii*. Infection with *Cl. septique* is usually accompanied by enteritis. If *Cl. chauvoei* is involved, an easily distinguishable " Zeissler's finding II " is always present, but no intestinal changes are observed. Change of blood colour from dark red to light red does not seem to be typical of *Cl. chauvoei* infection alone. Significant growth into long threads on the surface of the liver appears to be undoubtedly a feature of *Cl. septique*, but it is not constant.

A technique is described for the identification of anaerobes.—B. OSWALD.

BOUGHTON, I. B., & HARDY, W. T. (1941). **Infectious Entero-Toxemia (Milk Colic) of Lambs and Kids.**—*Bull. Tex. agric. Exp. Sta.* No. 598. pp. 20.

An " extension bulletin " giving a general account of the condition as it occurs in Texas, with references to the work done in Australia and in the United Kingdom.

FRIEDEMANN, U., HOLLANDER, A., & TARLOV, I. M. (1941). **Investigations on the Pathogenesis of Tetanus III.**—*J. Immunol.* **40.** 325–364.

The experiments described and the review of the literature contained in this paper confirm Meyer's theory that tetanus toxin spreads in the body within the nerves and central nervous system, and does not reach the c.n.s. directly from the bloodstream. Alternative theories which tend to stress the importance of the bloodstream, the reflex arc, and changes in the muscle etc., are examined but abandoned as a result of the present experiments. The most important facts which the authors now feel they have established are as follows :– (1) tetanus toxin reaches the c.n.s. by way of the motor nerves ; (2) it migrates within the c.n.s. ; (3) local tetanus is of central origin ; and (4) the evidence strongly suggests that the walls of the capillaries of the c.n.s. constitute an impermeable membrane for electro-negative substances such as tetanus toxin and viruses etc.

The pathogenesis of some neurotropic virus diseases is therefore also discussed in the light of these discoveries, which show that an inanimate substance can be transmitted within the nerve to the c.n.s.—J. KEPPIE.

HARMS, F. (1940). Beitrag zur Chemoresistenz von anaeroben Sporenbildnern im Serum. **[Resistance to Chemicals of Sporulating Anaerobes in Serum]**.—*Zbl. Bakt. I. (Orig.).* **146.** 116–123.

Bovine defibrinated blood was treated with formalin, and to the serum so obtained 0·5%

phenol was added. *Clostridium oedematiens* loses its pathogenicity in such a serum in two days at room temperature. Cultures 1–3 days old are no longer viable after 1–2 days in the serum, but older cultures are much more resistant. 1–3 days old cultures of *Cl. parasarcophysematos* [*chauvoei*] are present in the serum (as shown by their effect on g. pigs) 2–14 days after being put into the serum, and older cultures can be demonstrated in the serum for longer periods.—J. M. Robson.

Kaplan, I., & Williams, J. W. (1941). **Spore Formation among the Anaerobic Bacteria. I. The Formation of Spores by *Clostridium sporogenes* in Nutrient Agar Media.**—*J. Bact.* **42.** 265–281.

In a Difco nutrient agar medium (1% agar, 0·33% peptone, 0·2% meat extract), buffered with phosphates, no growth of a strain of *Cl. sporogenes* occurred at pH 5·3 in four days of incubation at 37°C. in an atmosphere of 5 mm. oxygen and 755 mm. nitrogen, but growth did take place between pH 5·7 and pH 8·75. Some spores were formed wherever growth was initiated, but not in more than 3% of organisms at or below pH 6·1 in four days. The optimum pH for spore formation lay between 6·9 and 7·4, spores being first formed about 25 hours after inoculation, which, it is suggested, might be the time when the logarithmic stage of bacterial growth ended. Increase of the peptone of the medium beyond a necessary minimum did not greatly affect the rate of formation of spores, while variations in the meat extract content had even less influence. The presence of either of the fermentable carbohydrates, maltose and glucose, in the medium almost completely inhibited spore formation, while lactose, which was not fermented, apparently stimulated the formation of spores.—E. Cotchin.

Wahlin, J. G., & Almaden, P. J. (1939). **The Megalomorphic Phase of Bacteria.**—*J. infect. Dis.* **65.** 147–155.

Fifteen strains belonging to the coliform group and the genera *Brucella*, *Alcaligenes*, *Aerobacter*, *Klebsiella*, and *Serratia* were grown on a synthetic medium to which a veal or beef liver infusion with 2–4% dextrose had been added where necessary. Stained preparations, made at intervals of 4–8 hours over a period of days, were examined microscopically in an endeavour to differentiate cells of large and striking appearance, regarded by the authors as functional units, from involution forms. All strains produced megalomorphs, the formation of which was studied in detail on solid media. In all cases filament formation characteristic of the R phase preceded the development of megalomorphs, although the mode of origin varied and gave rise to structures of several types. The megalomorph was considered by the authors to be a stage in the bacterial life-cycle entirely distinct from the involution form. The question of the function of the megalomorph has yet to be investigated.—R. O. M.

Kligler, I. J., & Grossowicz, N. (1941). **The Function of Nicotinic Acid in Bacterial Metabolism.**—*J. Bact.* **42.** 173–192.

Experiments conducted with *Salmonella paratyphi A* as test organism showed that nicotinic acid added in varying amounts to a carbohydrate-free synthetic or peptone medium (nicotinic acid free) had little appreciable effect on growth. Better growth was obtained in some media without nicotinic acid, but in other media the reverse was true. Glucose and other fermentable carbohydrates added to such media in the absence of nicotinic acid may inhibit or even prevent growth. Lactose either shows no such effect or only to a lesser degree. Nicotinic acid plays an essential role in the fermentation of carbohydrates but is not a specific growth-promoting substance. It is essential for the complete utilization of lactic acid and particularly so for the oxidation of acetic acid, but does not appear to play a part in the oxidation of formic acid by the test organism. Dehydrogenation experiments indicate that the mode of action of nicotinic acid is not as a dehydrogenase, but rather that it must first be converted to a cozyme-like substance (codehydrase). Such conversion only occurs in the living cell. It is tentatively assumed that nicotinic acid functions in the animal cell in a manner not essentially different from that in the bacterial cell.—Alfred Eden.

Ehrismann, O. (1940). Ueber das Verhalten aerober und anaerober Bakterien gegenüber Askorbinsäure. **[The Behaviour of Aerobic and Anaerobic Bacteria towards Ascorbic Acid].**—*Z. Hyg. InfektKr.* **123.** 16–44. [Abst. from author's summary].

It was found that obligatory anaerobes are

favoured by ascorbic acid, obligatory aerobes are inhibited, and facultative anaerobes are not affected. Haemophilic bacteria could be inhibited by high concentrations of the acid, whereas tubercle bacilli were unaffected. The mechanism of this action is discussed in some detail.

SAZ, A. K., & BERNHEIM, F. (1941). **The Effect of 2, 3, 5, Triiodobenzoate and Various Other Compounds on the Growth of the Tubercle Bacillus.**—*J. Pharmacol.* **73.** 78–81. [Addendum by MIMS, L., & JOHNSTON, F. R. pp. 81–84].

The inhibitory action of substituted benzoic, nicotinic and sulphonic acids on the growth of the H37 and B_1 strains of tubercle bacilli was studied. The results indicated that 2,3,5-triiodobenzoate and 3,5,diiodo-2-hydroxybenzoate were most effective, the former being bacteriostatic and the latter both bacteriostatic and bactericidal. Single intraperitoneal injections of 2,3,5-triiodobenzoate into rats and g. pigs, and oral administration in man resulted in no toxic symptoms, although repeated injections in g. pigs were shown to produce loss in weight and some liver damage.—J. P. G.

DISEASES CAUSED BY PROTOZOAN PARASITES

*PALTRIMERI, S., CACCARELLI, A., & MENASCE, I. (1939). Transmission expérimentale du surra à un dromadaire de la race autochtone de Somalie. **[Transmission of Surra to a Somaliland Camel].**—*Boll. Soc. eustach.* No. 3. p. 107. [Abst. from abst. in *Bull. serv. zootech. Epiz. A.O.F.* **3.** 135].

A strain of *Trypanosoma evansi*, which had been passaged for four years in g. pigs, set up a chronic infection when inoculated into the Eritrean [? Somali] camel. The infection resembled in every way naturally occurring trypanosomiasis of Eritrean camels.

KUPPASWAMY, A. R. (1941). **Experiment in Trypanosoma evansi.**—*Indian vet. J.* **18.** 59–74. [Practically identical article appeared in *Rep. Malay. vet. Ass., 1939–40.* pp. 20–25 (1940).]

K., working in Penang, observed that after *T. evansi* had been passaged through goats, it caused fatal infection in eight dogs, 14 g. pigs, a calf, and a cat. Goats, as well as cattle, are considered to be reservoirs of *T. evansi.* The mercuric chloride and formol-gel tests gave indefinite results in diagnosis.—H. N. RAY.

PANDE, P. G. (1941). **A Natural Case of Cutaneous Leishmaniasis in a Bullock in Assam.**—*Indian J. vet. Sci.* **11.** 98–104.

This is the first record of the occurrence of a natural case of cutaneous leishmaniasis in a bovine host. Examination of smears from the ulcerative lesion in the affected animal revealed the presence of numerous parasites morphologically indistinguishable from *L. donovani* or *L. tropica.* The histopathology and haematological findings agreed closely with those of leishmaniasis in man. The case was encountered in an important endemic kala-azar centre where *L. donovani* is the only species known to occur.—C. V. G. CHOUDARY.

ABRAMOV, G. (1938). **[Leishmaniasis in the Coastal Region of Yugoslavia].**—*Glasn. hig. Zav.* **21.** 325–330. [In Serbian: abst. from French summary].

In this area 19 dogs, suspected from palpation to be affected with leishmaniasis, were examined and the organisms were demonstrated in spleen pulp and bone marrow of seven of them. Since 1932, A. had examined a number of human cases of leishmaniasis in this region, many of which had not been in contact with dogs. He suggests that affected cats as well as dogs may be reservoirs of human infection. He states that the role of *Phlebotomus perniciosus* as vector is not established and suggests that ticks may act as vectors. A tick was removed from a cutaneous ulcer in a human patient before the onset of leishmaniasis.

HEES, E. (1938). **Epidemic Trichomonad Infections and Experimental Studies thereon.**—*J. Egypt. med. Ass.* **21.** 813–837. [In English].

From 1934–36 in Wiesbaden, Germany, H. observed an increase in the incidence of human vaginal trichomoniasis from the normal seasonal fluctuation of 17–70% to a continual morbidity of over 70%. Concurrently there was an outbreak of blood infection, with symptoms of cachexia, emaciation, and severe chlorosis. The organism isolated from the blood and vaginas of infected women during this epidemic was not *T. vaginalis*, but a form morpho-

logically intermediate between *T. hominis* and *T. ardin delteili*. In the winter of 1936–37 the epidemic subsided, blood infection was no longer detected, and only *T. vaginalis* could be isolated from infected vaginas. The outbreak coincided with a change in the system of milk distribution in Wiesbaden, involving pooling of milk from many herds. In 50–75% of several hundred human and animal cases, WAGNER & HEES [*V. B.* **9.** 306.] observed trichomonads of the peculiar new type in the blood, intestines, genital organs, and foetuses of man, cattle, horses, dogs, cats, and pigs.

A series of transmission experiments was made on human volunteers with various pure strains and with organisms isolated from blood and uteri of infected cattle in the district. Cervical inoculation of *T. columbae* into healthy vaginas or those naturally infected with *T. vaginalis*, and subcutaneous injection in healthy women, produced no infection and such cases were regarded as controls. Cervical inoculation of *T. genitalis bovis* [= *T. foetus*] into naturally infected vaginas reinvigorated the *T. vaginalis*, but *T. foetus* itself was recoverable for only a few hours and could not be cultivated. Similar inoculations of *T. foetus* and *T. vaginalis* into healthy vaginas resulted in discharge of the unaltered organisms for 12 and 15 days respectively, but neither of them multiplied or could be cultivated. Cervical inoculation of *T. hominis*, *T. ardin delteili*, and a strain of the intermediate form isolated from bovine blood produced in each case severe *T. vaginalis* infection after eight days, followed by emaciation and other symptoms of acute trichomoniasis. Subcutaneous injection of *T. foetus* produced similar results in six out of ten cases. Infection of the blood and faeces was not detected in any of these cases.

Oral administration of a single dose of *T. foetus* culture failed to set up infection in two cases. A third case was given five large doses in six days. After the 8th day, the "triple species" *T. hominis—ardin delteili* could be cultivated from blood and faeces. Two weeks later, *T. vaginalis* in great numbers was found in the vaginal and cervical discharge.

H. concludes that all human and mammalian species are variants of a single organism, and that reversible dissociation is responsible for the variety of forms observed. He considers that infected cattle may be a source of epidemic human trichomoniasis, and that dogs, cats, and house flies may serve as intermediaries.—E. S.

TRUSSELL, R. E., & MCNUTT, S. H. (1941). **Animal Inoculations with Pure Cultures of Trichomonas vaginalis and Trichomonas foetus.**—*J. infect. Dis.* **69.** 18–28.

A number of experiments was designed to provide more information on the problem of the source of infection in human vaginal trichomoniasis [see preceding abst.]. Cattle, swine, sheep, goats, horses, monkeys, g. pigs, rabbits, cats, and dogs were inoculated intravaginally with bacteria-free cultures of *T. foetus* and *T. vaginalis*. Of these, only monkeys became infected with *T. vaginalis*. Cattle were infected with *T. foetus* and transient infections were obtained with this parasite in dogs. [It is stated that no vaginal inoculations of human beings with *T. foetus* have been made, but see again preceding abst.] Oral, rectal, subcutaneous, intraperitoneal, intravenous, and intracranial inoculations with both organisms into some of the above-mentioned animal species and, in addition, chicken, turkeys, and pigeons, failed to produce infection. Both organisms were successfully maintained in chick embryos, although this was more difficult with *T. vaginalis*. A short description is included of sections of the vaginas and vestibules obtained from some of the infected dogs.—M. L. BINGHAM.

CORRADETTI, A. (1940). **The Significance of the Exo-Erythrocytic Cycle of Plasmodia.**—*J. trop. Med.* (*Hyg.*). **43.** 110–113. [Author's summary copied *verbatim*].

The interpretations of the exo-erythrocytic cycle shown by some species of plasmodia are discussed and the conclusion is reached that this cycle is probably a test of the degree of adaptation reached by each species in its relations with its respective host, during the slow evolutionary processes which differentiate the *Haemosporidiidea* from the coccidia..

I. RUSSELL, P. F., MULLIGAN, H. W., & MOHAN, B. N. (1941). **Specific Agglutinogenic Properties of Inactivated Sporozoites of** *P. gallinaceum*.—*J. Malar. Inst. India.* **4.** 15–24.

II. MULLIGAN, H. W., RUSSELL, P. F., & MOHAN, B. N. (1941). **Active Immunization of Fowls against** *Plasmodium*

gallinaceum **by Injections of Killed Homologous Sporozoites.**—*Ibid.* 25–34.

I. A report on the use of ultra-violet irradiation as an effective means of rendering sporozoites of *P. gallinaceum* non-infective to susceptible fowls. Repeated injections of such sporozoites into fowls produced specific agglutinins, the titre in such cases being higher than that observed in the serum of fowls with acute or chronic infections induced by blood inoculation of the homologous plasmodium.

II. Repeated injections of large numbers of inactivated sporozoites of *P. gallinaceum* in domestic fowls cause a rise in the serum agglutinin titre against homologous sporozoites. The conclusion is that it may be possible to bring about partial immunization by injecting large doses of inactivated sporozoites.—B. C. B.

SHORTT, H. E., & MENON, K. P. (1940). **Experimental Production of Monkey and Avian Malaria by an Unusual Route of Infection.**—*J. Malar. Inst. India.* **3.** 195–198. [Authors' summary copied *verbatim*].

Monkeys and chickens can be readily infected with their respective malarial parasites by giving them infected blood by the oral route.

YANEV, E. (1938). [**A Scheme for the Differentiation of Piroplasms**].—*Vet. Sbir.* **42.** 100–111. [In Bulgarian: abst. from German summary].

Differentiation of piroplasms is based on differences in their morphological, pathogenic, and chemico-biological characters, but it is pointed out that in deciding what species is present in peripheral blood all the characters have to be taken into consideration and reliance cannot be placed on morphology alone, particularly as mixed infections commonly occur. A method is described of recording the results of blood examination which gives a complete picture of the nature of the infection, the following points being recorded :– percentage of erythrocytes invaded, number of parasites in one red blood corpuscle, quantity and appearance of the chromatin, presence or absence of Koch's bodies or Maltese cross forms, shape of the parasites, size in relation to the radius of the r.b.c., and position of the parasite in the r.b.c. As a routine, 100 infected r.b.c. are examined and the findings recorded. The examination of each blood preparation takes about half-an-hour.—U. F. RICHARDSON.

*TOBLER, J. (1939). Die Aenderungen des Blutbildes bei Rindern der schweizerischen Braunviehrasse im Verlauf der Präimmunisierung gegen Tristeza und gegen Anaplasmosis. [**Blood Picture Changes in Swiss Brown Cattle under Immunization against Piroplasmosis and Anaplasmosis**].—*Inaug. Diss., Zurich.* [Abst. from abst. in *Berl. Münch. tierärztl. Wschr.* Aug. 9th. 389. (1940)].

Vaccination losses in cattle immunized in Switzerland against piroplasmosis and anaplasmosis amounted to 12%. The blood picture was typical for animals so infected. The reaction due to piroplasmosis in inoculated cattle can be controlled by piroblue but the anaplasmosis can only be treated symptomatically. Urobilin estimations in the faeces are of prognostic value. Haemoglobinuria is not constantly present in piroplasmosis, and is not of much prognostic importance. The blood haemoglobin in inoculated cattle is more reduced by the anaplasmosis than by the piroplasmosis, occasionally to below 20%.

LOTZE, J. C., & YIENGST, M. J. (1941). **Mechanical Transmission of Bovine Anaplasmosis by the Horsefly, Tabanus Sulcifrons (Macquart).**—*Amer. J. vet. Res.* **2.** 323–326.

A report of experiments in which three susceptible bovine animals developed anaplasmosis 24–28 days after being bitten by the horsefly, *T. sulcifrons*, which had previously been allowed to feed on an infected bull. The evidence indicates conclusively that transmission was effected by this insect. The authors suggest that the time factor may be of great importance in insect transmission. In the present experiments the infected animal was kept in close proximity to the susceptible animal and only a few seconds elapsed between the time when the horsefly was removed from the infected animal and the time when it began feeding on the susceptible one.—N. J. SCORGIE.

*NIKOLTSCHEFF, K. (1939). [**Sarcosporidiosis of Buffaloes in Bulgaria**].—*Jb. Vet.-med. Fak. Sofia.* **14.** 357–372. [In Bulgarian]. [Abst. from abst. in *Jber. Vet.-Med.* **66.** 56].

Direct microscopic and histological examinations for sarcosporidia were carried out on slaughter buffaloes at Sofia abattoir. Sixty-two

animals under six years [? months] of age were all unaffected; there were seven cases among 110 animals of 6–12 months of age, 27 cases among 103 animals of 1–2 years, 25 cases among 45 of 2–5 years and 245 cases among 288 of five years and over.

RAHIMUDDIN, M. (1941). **Sarcosporodiasis in Cattle.**—*Indian vet. J.* **18.** 108–109.

Out of 2,700 carcasses of cattle and 600 of buffaloes examined by R., two of the former and 160 of the latter were infested with sarcosporidia, most of which were found in the muscular coat of the oesophagus. The question is raised as to whether the aquatic habits of buffaloes are in any way connected with the greater proportion of infestation in these animals.—H. N. RAY.

OTTOSEN, H. E. (1940). Leptospirainfektionernes aetiologiske betydning for hundens chroniske nephritis. [**Leptospira as a Cause of Chronic Nephritis in Dogs**].—*Beretn. 5. nord. Vet.-møde, Kbh., 1939.* pp. 1022–1034. [In Danish: German summary. Discussion pp. 1034–1036]. [See also *V. B.* **12.** 17].

Work was done on various aspects of the problem as follows.

(1) Examination of dogs for nephritis. Of 197 dogs of unstated history 65 were found to be affected with kidney disease P.M. Forty-five had chronic interstitial nephritis, seven had lymphocytic interstitial nephritis, six had degenerative changes in the kidney tubules, and 15 had lymphoid infiltrations in the cortex.

(2) An attempt was made to determine whether albuminuria was present in the above cases, but exact significant results were unobtainable: in many cases the bladder was empty.

(3) In serological tests for leptospira, 181 dogs with various diseases of known clinical history were tested. 91 reacted, 77 reacting more strongly against *L. canicola* antigen, 12 more strongly against *L. icterohaemorrhagiae*, and two against both equally. Seventy-four of these dogs showed clinical signs of nephritis and 51 had a blood urea content in excess of 60 mg.%.

Three tables show the relationship between serological test results on the one hand and nephritis and blood urea content on the other. Fifty-two of the 74 with nephritis of the above 181 dogs were serologically positive, as were 39 of the 107 dogs without nephritis.

In another group of dogs sent for euthanasia, 36 out of 45 with nephritis were serologically positive, as were 19 out of 152 without nephritis. Thirty-eight out of 51 sick dogs with a blood urea content in excess of 60 mg.% were serologically positive, as were 50 out of 128 with blood urea below 60 mg.%.

O. concludes that the majority of cases of nephritis in dogs are due to leptospira infection.
—J. E.

DISEASES CAUSED BY VIRUSES AND RICKETTSIA

KONEČNY, S. (1939). Studie o účinku některých chemikálií na průběh slintavky a kulhavky. [*In vitro* **and** *in vivo* **Action of Some Chemicals on Foot and Mouth Disease Virus**]. — *Spisy vys. Školy Zvěrolék., Brno.* **16.** 1–30. [Abst. from German summary].

In vitro tests showed that the virus in blood plasma was killed in 5 min. by 0·5% solutions of silver nitrate, in eight hours by 0·05% solutions and in 24 hours by 0·005% solutions. 5% and 2½% resorcin solutions killed the virus in 5 min. and 2% solutions in 30 min. The viricidal power of 0·1% vuzin hydrochloride, 2% "selectan", 50% "uberasan", 50% "cuprocollargol" and 50% "elektrocollargol" was too low for these substances to be of practical use.

In vivo tests in g. pigs showed that none of the above substances gave promising results therapeutically, although almost toxic doses of silver nitrate, "selectan", "uberasan", and "cuprocollargol" appeared to delay generalization of the disease to a small extent.

GRAÜB, E., ZSCHOKKE, W., & SAXER, E. (1940). Zu den Impfungen mit Kristallviolett-Vakzine gegen Maul- und Klauenseuche. [**Use of Crystal-Violet Vaccine against Foot and Mouth Disease**].—*Schweiz. Arch. Tierheilk.* **82.** 461–466. [Translation of abst. in *Dtsch. tierärztl. Wschr.* **49.** 113].

The use of crystal-violet vaccine in more than 5,000 herds in an infected area in Switzerland has shown that it affords a considerable

protection against F. & M. disease. Vaccination "breaks" during the epizootic occurred only in 0·09–0·35% of the vaccinated herds.

CILLI, V. (1939). Ulteriori considerazioni sul problema della peste bovina. [**Further Considerations on Rinderpest**].—*Nuova Vet.* **18.** 51–59.

C. reviews, at some length, the methods which have been adopted in various parts of the world for immunization against rinderpest, and draws the conclusion that no method yet practised is completely successful. In Eritrea, the serum-virus method is considered to be the best, and in the year before the article was written, 260,000 animals had been treated in this way, with an insignificant mortality. No cases of rinderpest had occurred in inoculated animals, and it was planned to inoculate all young stock to maintain this freedom from the disease.—J. B. BROOKSBY.

*ALKEWITZ, W. (1939). Uebertragungsversuche der Bornaschen Krankheit der Pferde auf Hühner. [**Attempts to Transmit Borna Disease to Fowls**].—*Inaug. Diss., Munich.* pp. 13. [Abst. from abst. in *Jber. Vet.-Med.* **66.** 498].

It was not possible to infect fowls with Borna disease by intracerebral, intraneural, subcutaneous, intraperitoneal, or intramuscular injection of rabbit-passaged virus.

I. CASÓS, G. A. (1941). La encefalomielitis de los equinos en la Republica Argentina. [**Equine Encephalomyelitis in the Argentine**].—*Rev. Med. vet., B. Aires.* **23.** 123–143.

II. QUEVEDO, J. M. (1941). Consideraciones sobre la encefalomielitis equina en el país. Reseña histórica. [**Equine Encephalomyelitis in the Argentine**].—*Ibid.* 232–238.

I. E.E. has apparently been in existence in the Argentine for a long time. There were serious epizootics in 1920, 1934, 1936, and 1941, although the disease was not identified as such until 1933.

The virus is similar to the Western type of the U.S.A., although the clinical symptoms are not as severe and losses not as great. Attempts at immunization with killed virus proved unsuccessful, but good results have been obtained with chick-embryo vaccines from the U.S.A., prepared from Western type virus. The virus is infective at a dilution of 1 in 1 million and cats and dogs are susceptible. It is present in the central nervous system and great nerve trunks. During the 1936 epizootic there was an epidemic of infantile paralysis or poliomyelitis [comment is made, but no evidence is given of aetiological relationship with E.E.]

In the epizootics of 1933 and 1936 it was observed that horses with severe *Gastrophilus* infestation were the most frequent victims of E.E., so that this parasite may predispose to the infection. In the 1941 outbreak it was again found that most of the horses which succumbed to the disease were badly infested with *Gastrophilus*.

In recent years the mortality from the disease has diminished; during the 1941 epizootic, the percentage of deaths averaged only 5·13%. Control depends upon vaccination with chick-embryo vaccines of Western type virus; treatment of *Gastrophilus*-infested horses is being carried out on a wide scale.

II. This paper is mainly historical. Outbreaks of E.E. have occurred in the Argentine since 1910. In the past it was confused with "cornstalk disease". The disease occurs in acute and benign forms, the symptoms being nervous derangement, defective vision, deafness, muscular paralysis, and digestive disturbances. The lesions mainly affect the cerebrum and meninges, with focal necrosis of the former. The predisposing effects of *Gastrophilus* infestation have been noted by various workers.—MILLER WATSON.

TRAUB, E. (1941). Serotherapeutische Versuche bei der künstlichen Infektion des Meerschweinchens mit den Virus der amerikanischen Pferdeencephalitis. [**Serum Therapy Trials in G. Pigs Infected with American Equine Encephalomyelitis Virus**].—*Zbl. Bakt. I. (Orig.).* **147.** 81–93. [Abst. from author's summary].

Intravenous injections of a potent antiserum regularly protected g. pigs when given in the initial febrile period, but not later. Rabbit immune serum was more potent than serum prepared in g. pigs, horses, pigeons, or fowls. Antiserum did not always behave similarly in virus neutralization tests in mice and in therapeutic tests in g. pigs. Antiserum was found to be rapidly viricidal to virus in plasma and slowly viricidal to that in blood corpuscles. The results of the work suggested that anti-

serum acts curatively not solely on virus in the blood, but also in some other manner as yet unknown.

VARDIMAN, P. H., BOLIN, F. M., & SEVERSON, A. S. (1941). **Pig Anaemia and Hog-Cholera Immunity.**—*Amer. J. vet. Res.* **2.** 354–355.

Losses were encountered among anaemic piglets of sows immunized against swine fever; administration of S.F. antiserum prevented further losses. An experiment was carried out to determine whether the anaemic condition of the piglets destroyed the passive immunity to S.F. acquired from the sows' milk. Thirty-five piglets, comprising the litters of four sows immunized against S.F., each received an injection of 2 ml. of S.F. virus; half of each litter received a ferrous sulphate copper sulphate supplement to prevent anaemia. Four died from the Fe-Cu supplemented group and five from the unsupplemented group. These results indicate that pig anaemia does not predispose to S.F.—C. V. WATKINS.

I. GRAU, H. (1941). Zur Diagnosestellung bei ansteckender Schweinelähme in den Veterinäruntersuchungsämtern. [**Diagnosis of Porcine Encephalomyelitis by the Veterinary Investigation Offices**]. —*Berl. Münch. tierärztl. Wschr.* Feb. 21st. 85–88.

II. LANGNER. (1941). Die Bekämpfung der ansteckenden Schweinelähme. [**Control of Porcine Encephalomyelitis**].—*Tierärztl. Rdsch.* **47.** 13–18. [Précis appeared in *Dtsch. tierärztl. Wschr.* **49.** 44. (1941)].

III. FORTNER. (1941). Experimentelle Untersuchungen über die ansteckende Schweinelähme. [**Research on Porcine Encephalomyelitis**].—*Ibid.* 24. [Also appeared in *Dtsch. tierärztl. Wschr.* **49.** 43–44. (1941)].

IV. TRAUB, E. (1941). Die ansteckende Schweinelähme im Vergleich mit der Pseudowut und Schweinepest. [**Porcine Encephalomyelitis Compared with Aujeszky's Disease and Swine Fever**]. —*Ibid.* 122–123.

V. SCHÄFER, W., & HEYNEN, K. (1941). Untersuchungen über das Vorkommen des Virus ansteckenden Schweinelähme im Blute infizierter Ferkel. [**The Occurrence of Porcine Encephalomyelitis Virus in the Blood of Infected Piglets**]. —*Zbl. Bakt. I.* (*Orig.*). **147.** 25–32.

I. G. gives the results of experiences of the first year's diagnostic work on P.E. at the veterinary investigation office at Karlsbad, one of many such institutes acting in an official capacity in the control of the disease.

Diagnosis is founded on the results of histological examination of the brain and spinal cord: the finding of a non-purulent encephalomyelitis gives grounds for a positive diagnosis. The characteristic changes, which are most often found in the region of the corpora quadrigemina and pons of the brain and in the upper cervical and lumbar parts of the spinal cord, are summarized as follows:– (1) perivascular cuffing in the brain and cord, (2) diffuse and focal round cell infiltration, (3) ganglion cell degeneration, (4) round cell infiltration in the meninges, (5) dilatation of the central canal of the cord, and (6) changes denoted in (2) and (3) occurring also in spinal ganglia. These changes are described at length and illustrated by four photomicrographs and are correlated with the variations in clinical picture.

It is pointed out that these changes are not exclusive to P.E., but may occur more or less similarly in swine fever and paratyphoid. Thus in official diagnosis it is only possible to say whether a positive answer is justified on the basis of the histological findings, the rest depending on the clinical diagnosis.

Advice is finally given on the best way to pack and send brain and cord material with the object of obtaining the quickest possible decision.

II. This is a detailed explanation and discussion of the application of all the German laws which concern P.E. and its control. It is intended for German veterinary and other authorities and for farmers who are already familiar with the German legislation.

III. P.E. was transmitted to healthy pigs in 91 instances, in 79 of which intranasal inoculation alone was used. The most effective infective tissue was brain + spinal cord suspension taken in the first or second day of illness. Material taken from the fifth day onwards was not infective. The faeces of acute cases were sometimes infective. The incubation period was about 14 days and the pigs showed convulsions before paralysis. Half the infected pigs died within five days and the rest survived; some recovered completely but many remained

paralysed. Total losses from acute or chronic effects amounted to 70%. No other animals but pigs could be infected. Recovered pigs were immune. Contact infection succeeded in 25% of the experiments: infective nervous material when fed to pigs never produced the disease.

In disinfection trials, 2% NaOH was ineffective within seven hours, but a 3% solution killed the virus in one hour. Also effective were 2% formalin in one hour and 5% chloramine [" rohchloramin ", probably chloramine T] in three hours.

IV. T. obtained pure strains of virus from all three diseases and determined, by infecting with the virus of Aujeszky's disease and with S.F. virus piglets which had been artificially immunized against P.E., that there is no immunological connexion between P.E. and S.F., or P.E. and Aujeszky's disease.

With regard to the differentiation of these diseases by histopathological methods, T. found that the following chief differences exist between S.F. and/or Aujeszky's disease and P.E. :- in P.E. the grey matter of the brain and spinal cord is preponderantly affected, the inflammatory process is more intense, there is often a severe meningitis around the cerebellum, the spinal ganglia and sciatic nerves may be affected, and there are no changes in the visceral organs such as characterize S.F. and may be present in Aujeszky's disease.

V. Experiments on a few piglets which were repeatedly inoculated intracerebrally with heart blood from artificially infected piglets did not result in the appearance of the typical disease, though the results were suggestive that blood may contain a small amount of virus.

—J. E.

TUNNICLIFF, E. A., & MATISHECK, P. H. (1941). **A Filterable Virus Demonstrated to be the Infective Agent in Ovine Balano-Posthitis.**—*Science.* **94.** 283–284.

Ovine balano-posthitis has been recognized as a venereal disease in some parts of U.S.A. and other countries for over 30 years. It is characterized by ulceration and scab formation on the preputial orifice, the penis, and the lips of the vulva. Until recently the disease has been classified as one of the many *Fusiformis necrophorus* infections. The authors failed to find this organism in two affected rams. No bacteria could be incriminated in a number of affected sheep. Swabbing suspensions of diseased tissues on to the vulva, prepuce, or penis after scarification readily induced the disease in sheep, as did also infective bacteria-free filtrates.—C. V. WATKINS.

WYCKOFF, R. W. G., & TESAR, W. C. (1941). **The Potencies of Commercial Antirabic Vaccines.**—*J. Immunol.* **40.** 383–390.

Using their mouse potency test [*V. B.* **11.** 225.], the authors tested 45 lots of commercial carbolized or chloroformized vaccines. Some of the vaccines were judged to be potent and some relatively impotent. The degree of potency did not depend upon the various producers, separate batches of the same type of vaccine from the same maker being found to vary extremely in potency.

It appeared from the work that a fixed virus could safely be used as test virus to provide a reliable indication of the potency of a vaccine against any average street virus.—J. E.

—. (1941). Deutsches Reich. Runderlass des Reichsministers des Innern, betr. Bekämpfung der Tollwut. **[Germany: Circular on the Control of Rabies].**—*Reichsgesundheitsblatt.* **16.** 400–403.

Owing to an increase in rabies in the eastern parts of the Reich, the Minister of the Interior has issued these instructions which are to be uniformally applied throughout. They are orthodox control measures mainly applying to dogs and include draft copies of the official report forms to be used.—J. E.

MORRILL, C. C., & GRAHAM, R. (1941). **An Outbreak of Bovine Pseudorabies or " Mad Itch ".**—*Amer. J. vet. Res.* **2.** 35–40.

M. records the isolation in Illinois of the virus of Aujeszky's disease from a steer. Spinal cord of the affected animal was infective, but the brain, blood, and urine were not. Pooled, filtered emulsions of the spinal cord of the steer and of several infected rabbits were given subcutaneously to a horse, two pigs, and a dog and caused no significant reaction, but one rabbit and a calf so treated contracted the disease. Another rabbit inoculated intraperitoneally became affected, but three other rabbits remained unaffected after intravenous, conjunctival, and intranasal inoculations. An account is given of the histopathological findings.

For control of the disease in bovines, the authors recommend removal from all contact

with pigs. It is stated that rats may harbour the disease.—C. V. WATKINS.

MGLEJ, S. (1939). Klinika nosówki w świetle najnowszych badań. **[Recent Advances in Dog Distemper]**.—*Przegl. wet.* **54.** 241–264. [Abst. from German summary].

A progress report of an unfinished attempt by LEGEZYNSKI and MGLEJ to prepare a canine distemper vaccine from dog virus passaged in mouse brains, and from infected brains subjected to desiccation over NaOH or to carbolization.

KOCH, W., & SCHERBAUER, I. (1941). Erfahrungen mit der Staupe-Simultan-Impfung. **[Experiences with Simultaneous Inoculation against Dog Distemper]**.—*Tierärztl. Rdsch.* **47.** 2–3.

This is evidently the first report of a test of the serum-virus method of immunization [see GEIGER—*V. B.* **11.** 448.] under practical conditions at the Eystrup Institute. Distemper broke out and caused numerous deaths at a dog's home. Over a period of 2½ years, 110 newly admitted dogs and puppies born at the home were immunized by virus followed by serum and 58 similar dogs were left as controls. Two of the immunized dogs and 54 of the controls contracted distemper. About six months after the immunization was begun a small silver fox farm was started on the same premises and 35 foxes were eventually immunized without the appearance of distemper among them.—J. E.

*HEIN, K. (1939). Die Erfolge der Bekämpfung der Ferkelgrippe in Riemser Einzelhüttenanlagen in fünf eingetragenen Zuchten des Verbandes Schlesischer Schweinezüchter. **[Results of Controlling Piglet Influenza by the Riems Single Hut System in Five Silesian Herds]**.—*Inaug. Diss., Berlin.* pp. 48. [Abst. from abst. in *Jber. Vet.-Med.* **66.** 388].

H. reports the successful control of piglet influenza in five large herds by the Riems isolated hut system, which is designed to prevent infection between litters, this being the most important factor in its epidemiology.

Data on losses before and after the application of this method show its value.

FRANCIS, T., Jr. (1941). **The Problem of Epidemic Influenza.**—*Trans. Coll. Phys. Philad.* **8.** 218–227.

This is a useful review of knowledge concerning the aetiology and epidemiology of human influenza. Two antigenically distinct influenza viruses, A and B, are now recognized as the primary causes of epidemic influenza. The severity of the disease and the type of epidemic produced by either of the viruses is, however, very variable and the two infections can only be differentiated on an aetiological basis.

—JOHN FRANCIS.

MORIYAMA, H., & OHASHI, S. (1941). **On the Activity of Phage and Vaccinia Protein Particles.**—*J. Shanghai Sci. Inst.* Sect. IV. **5.** 189–197. [In English].

This is a continuation of the authors' work on the nature of viruses [see *V. B.* **11.** 29.] It is shown that the "activity" of phage particles, *i.e.* the number of particles necessary for growth to occur, varies greatly, depending upon whether solid or fluid media are used, upon the type of media, and the method of phage production. The number of vaccinia particles required to produce lesions in the skin or testicle of rabbits is also very variable.

The border line between active and non-active particles is very obscure; they may be non-active under certain conditions and then become suddenly active under more appropriate conditions. It is concluded that it is extremely difficult or impossible to estimate the absolute titre of a virus sample. [It is of course obvious that the same type of phenomena occur with bacteria.]—JOHN FRANCIS.

SOLARINO, G. (1939). Ricerche sul virus dell'affezione diftero-variolosa aviaria. **[The Virus of Fowl Pox]**.—*IV Congr. int. Pat. comp., 1939.* **2.** 279–284. [In Italian].

S. claims to have cultivated the virus of avian pox on common laboratory media, in symbiosis with an organism of the pasteurella group in the case of pigeon pox, and with *Chromobacterium prodigiosum* in the case of fowl pox. The virus is obtained from liver, which is a better source than either blood or epithelial lesions. The inoculation of these cultures, by scarification, into susceptible pigeons and fowls produced, after an incubation period of 4–20 days, typical lesions of both the epithelial and diphtheritic types. A vaccine, containing 200 million organisms per ml., was prepared

from subcultures attenuated at 60°C. for 30 min. in the presence of 0·5% phenol. Given intramuscularly, this vaccine protected for five months. It was also of value in treatment. Both the fowl and pigeon viruses were filtrable through the Berkefeld N or the Chamberland L2 candle.—J. B. BROOKSBY.

WEINECK, E. (1940). Ueber die Reaktionsfähigkeit des Hühnerpestvirus nach quantitativ abgestufter Absättigung der Erythrozyten. **[Reactibility of Fowl Plague Virus in Quantitatively Graded Saturation of Erythrocytes]**.—*Z. ImmunForsch.* **98.** 469–474.

Pre-treatment of 12-day fowl embryos with methylene blue or neutral red 12–15 hours before infecting them with fowl plague virus prevented development of the infection. This must be the time required to saturate the erythrocytes with dye and so prevent the development of the virus. Treatment with dye 4–10 hours before infection with virus merely produced a delay in the infectious process, which normally requires 12–14 hours to kill the embryo. Treatment with dye 1–4 hours before infection had no effect. W. concludes that the first four hours after infection are a period merely of virus dissemination, and then a phase of rapid virus production follows; hence the process is analogous to an autocatalytic reaction. The number of experiments carried out and detailed protocols of them are not given.—J. G. CARR.

WEINECK, E. (1940). Ueber die Protein-Lipoid-Symplexnatur des Hühnerpestvirus. **[The Protein-Lipoid-Simplex Nature of Fowl Plague Virus]**.—*Z. ImmunForsch.* **98.** 463–468.

The infectivity of tissues containing the virus was destroyed by extraction with alcohol-ether, alcohol, benzene, and chloroform, but not by acetone or ether. W. considers that this proves that the virulent component of the virus is lipoid in nature.—J. G. CARR.

*LOCHSTEDT, H. (1940). Untersuchungen über intra- u. extrazellulär liegende basophile Körperchen in der Konjunktiva des Schafes. **[Intra- and Extracellular Basophile Bodies (Rickettsia-Like Organisms) in the Conjunctiva of Sheep]**.—*Inaug. Diss., Hanover.* [Abst. from abst. in *Dtsch. tierärztl. Wschr.* **48.** 335].

L. states that GOETZE observed in the conjunctiva of a sheep, which had apparently transmitted bovine malignant catarrh to cattle, bodies similar to the rickettsia described in sheep in South Africa. L. examined normal sheep for the presence of these bodies and found them in every sheep [no figures] in the conjunctiva and also in a few cases in the nasal and vaginal mucosa. They were basophile, Gram negative and not acid fast, could not be cultivated on common culture media and could not be passed to rabbits, g. pigs, or cows.

EXNER, F. M., & LURIA, S. E. (1941). **The Size of Streptococcus Bacteriophages as Determined by X-Ray Inactivation.**—*Science.* **94.** 394–395.

The varying particle sizes of bacteriophages such as those of the colon-dysentery group, staphylococci, and *Bacillus subtilis* have previously been determined chiefly by ultrafiltration and centrifugation methods. A useful new method is described which depends on the measurement of the rate of inactivation of the phage suspension when subjected to X-rays. The sizes of the three streptococcus phages B, C, and D have now been measured for the first time and their relative magnitudes are respectively 26, 33, and 43; these values agree with the law of inverse proportions between phage particle size and plaque size on agar, as the small phage B forms large plaques, while the larger phage D produces very small plaques.
—J. KEPPIE.

FINDLAY, G. M. (1941). **The Present Position of Yellow Fever in Africa.**—*Trans. R. Soc. trop. Med. Hyg.* **35.** 51–72. Discussion pp. 72–76.

Yellow fever viricidal bodies have been found, by means of mouse-protection tests, in the blood of a considerable percentage of domestic animals in areas in Africa where the disease is endemic. The test has given a positive result in 25 of 166 cows, in 27 of 121 sheep and goats, in three of six horses, in three of 11 pigs, in three of five camels, in three of nine dogs, and in one of two ostriches, but in none of 20 hens. Viricidal bodies have, however, been found, although at lower concentrations, in the blood of sheep and cattle from areas where yellow fever is not known to be endemic, so that the value of this test in domestic animals cannot be regarded as established.

The significance of these findings in regard to the maintenance of endemic areas is discussed.

IMMUNITY

*Ljung, O. (1939). Ist positive Tuberkulinreaktion ein Zeichen von Tuberkuloseimmunität? Mit besonderer Berücksichtigung der Untersuchung an Krankenpflegepersonal. [**Tuberculous Allergy and Immunity**].—*Z. Tuberk.* **83.** 1. [Abst. in *Amer. Rev. Tuberc.* **43.** pp. 77–78 of absts., copied *verbatim*. Signed: G. C. L.]

From previous studies in Skandinavian children and nurses the conclusion cannot be made that tuberculin allergy is associated with tuberculosis immunity. On the contrary, the primary infection probably diminishes the resistance of the organism against tuberculosis. The original theoretical grounds for BCG vaccination as a protection against tuberculosis infection are dubious. The conclusions of the author are based on the literature discussed and not on investigations of his own.

*Limbeck, L. (1940). [**Changes in the Wattle Caused by the Intradermal Injection of Tuberculin in Tuberculous Fowls**].—*Közl. Oesszehas. élet- es kórtan Köreből.* **29.** 31. [Abst. from abst. in *Dtsch. tierärztl. Wschr.* **49.** 114].

A positive reaction has two stages, *viz*, a preliminary nonspecific oedema associated with numerous pseudoeosinophilic leucocytes, which appears soon after the injection and regresses by the 48th hour, and a second specific reaction consisting of a firm swelling due to tissue infiltration by fixed tissue cells and "mobilizable" adventitia cells. The wattle should be examined for this reaction between the 36th–48th hours, although it may persist until the 72nd or 96th hour.

*Marcis, A., & Buzna, D. (1940). [**Comparative Value of Mallein Prepared with Glycerinized Broth and with a Synthetic Medium**].—*Közl. Oesszehas. élet- es kórtan Köreből.* **27.** 251. [Abst. from abst. in *Dtsch. tierärztl. Wschr.* **48.** 359].

Mallein prepared from cultures on synthetic medium [no details] gave results as good as those obtained with mallein from glycerin broth cultures. To test samples, uninfected horses were injected subcutaneously with the mallein and their sera were examined at intervals for complement-binding and agglutinating antibodies. Samples were roughly titrated in this way.

Landsteiner, K., & Chase, M. W. (1937). **Studies on the Sensitization of Animals with Simple Chemical Compounds. IV. Anaphylaxis Induced by Picryl Chloride and 2 : 4 Dinitrochlorobenzene.**—*J. exp. Med.* **66.** 337–351. [For previous parts, see *V. B.* **7.** 431].

Landsteiner, K., & di Somma, A. A. (1938). **Studies on the Sensitization of Animals with Simple Chemical Compounds. V. Sensitization to Diazomethane and Mustard Oil.**—*Ibid.* **68.** 505–512.

Landsteiner, K., & Chase, M. W. (1939–40). **Studies on the Sensitization of Animals with Simple Chemical Compounds. VI. Experiments on the Sensitization of Guinea Pigs to Poison Ivy. VII. Skin Sensitization by Intraperitoneal Injections [in Conjunction with Killed Tubercle Bacilli].**—*Ibid.* **69.** 767–784, and **71.** 237–245.

Landsteiner, K., & di Somma, A. A. (1940). **Studies on the Sensitization of Animals with Simple Chemical Compounds. VIII. Sensitization to Picric Acid; Subsidiary Agents and Mode of Sensitization.**—*Ibid.* **72.** 361–366.

Landsteiner, K., & Chase, M. W. (1941). **Studies on the Sensitization of Animals with Simple Chemical Compounds. IX. Skin Sensitization Induced by Injection of Conjugates.**—*Ibid.* **73.** 431–438.

IV. In previous communications, sensitization effects in g. pigs, following intracutaneous or superficial administration of a number of simple chemical compounds, were reported. In the present paper it is shown that by cutaneous injection of small quantities of 2 : 4 : 6-trinitrochlorobenzene (picryl chloride) and 2 : 4-dinitrochlorobenzene (a typical incitant of contact dermatitis in man), it is possible to induce true anaphylactic sensitization in g. pigs, demonstrable by the injection of protein conjugates, (*e.g.* picryl horse serum) or by the Dale technique using isolated uterine horns. This furnishes strong evidence for the formation of antigenic conjugates following application of substances of simple chemical constitution. Since the anaphylactic state is induced by the same method of administration

as gives rise to cutaneous sensitivity, the assumption appears to be justified that the formation of conjugated antigens also offers an explanation for the skin effects.

In the experiments with picryl chloride, anaphylactic antibodies and occasionally precipitins were demonstrated. The differences between cutaneous and anaphylactic types of sensitivity are discussed.

V. With the object of rendering new types of chemicals available for investigation of drug hypersensitivity, methods are described for sensitizing animals with diazomethane and allylisothiocyanate (mustard oil). Both substances are highly reactive and readily capable of forming conjugates with substances in the animal body, the former compound being widely used in preparative chemistry for the introduction of methyl groups.

G. pigs were successfully sensitized to diazomethane, a substance known to cause severe allergic effects in man. With allylisothiocyanate, a substance to which skin hypersensitivity has been occasionally reported after use as counter-irritant, sensitization was experimentally effected in young Chester White hogs and in one out of six human subjects. In several g. pigs, three rabbits, and three monkeys, no definite results were obtained. Species and individual differences are therefore obvious in regard to development of allergy to various chemical compounds.

The hypersensitivity of the skin was not confined to the area of previous application but spread in quite general fashion, a fact accounted for by assuming transportation of the exciting substance as some sort of conjugate, or perhaps by transportation of antibodies.

VI. In experiments on g. pigs the latency period in sensitization to " contact dermatitis " by poison ivy was found to be five days. The chief investigation concerned the manner in which the whole skin becomes sensitive following treatment at a particular site. When the continuity of the skin was interrupted by deep incisions through the underlying thin muscular layer, a procedure which severed the superficial lymph vessels, sensitization after application of ivy extract to the isolated area was almost entirely prevented. On the other hand, if a strip of skin was removed around the test area in such a way as to spare the skin muscle, generalized hypersensitivity occurred. From this it is concluded that spread of sensitization is dependent not upon skin integrity but upon free passage of lymph. Inhibition of sensitization by incisions through the panniculus carnosus was also noted in anaphylactic sensitization with protein antigens, provided the dosage was sufficiently small.

The question may still be open whether the process of skin sensitization can be completed in or by the dermal tissues alone, since production of sensitivity by application of ivy to an " island " was not successful. On the other hand an island of skin isolated by interruption of the lymphatics can take part in the general sensitivity produced by treatment of the skin outside, and this can hardly be explained except by mediation of the bloodstream.

VII. In general it would appear that skin sensitization with simple chemicals, unlike common anaphylactic sensitization, has so far only been accomplished with certainty by the application of the incitant on or into the skin itself. In the present paper a method is described by which sensitization to pure picryl chloride was satisfactorily attained by intraperitoneal injection of the compound when killed tubercle bacilli suspended in paraffin were used as adjuvant. Sensitivity of the contact dermatitis type resulted.

Albino g. pigs were given a primary intraperitoneal injection of 0·10–0·25 mg. of killed tubercle bacilli in paraffin oil, followed two days later by 0·2 mg. of picryl chloride in 0·5–1·0 ml. of saline. On the next day a similar injection of tubercle bacilli was given, followed two days later by a terminal injection of picryl chloride; alternatively the second treatment consisted of injection of 0·2 mg. of tubercle bacilli in 1 ml. of paraffin oil containing 0·5 mg. of picryl chloride. Precautions were taken to avoid dermal contamination, by procedures such as incising the skin and passing the needle through the slit.

After a period of three weeks, the g. pigs were tested for hypersensitivity by spreading one drop of 1·5% solution of pure picryl chloride in olive oil on the clipped abdomen. Strong reactions were obtained in 60 out of 76 animals.

VIII. In sensitization experiments with certain compounds of similar chemical constitution, a definite correlation had been found by the authors between the capacity to sensitize and the ease with which substituted groups were replaceable. For example, the labile

2 : 4-dinitrochlorobenzene proved to be a powerful sensitizing agent whilst the compounds 1 : 2 : 4- and 1 : 4 : 2-dichloronitrobenzene, resistant to treatment with alkali or aniline, were ineffective.

From this point of view allergy to picric acid is of interest, a compound similar to nitro compounds previously tested but in which the No. 2 groups are not readily replaceable.

Sensitization of g. pigs to picric acid was obtained by application of oil solutions to the skin, preferably on inflamed sites or by treatment with a compound of picric acid with *n*-butyl-*p*-aminobenzoate. The lesions obtained in sensitive animals on superficial administration bore resemblance to human eczema. It is considered that picric acid sensitization may be an instance in which a substance does not sensitize directly but only after its conversion into a more reactive compound. The underlying principle should be of wider application to instances in which the original substance does not readily form conjugates.

IX. Experiments with g. pigs are described which show that under special conditions the intraperitoneal injection of conjugates made with homologous erythrocyte stromata leads to typical skin sensitization of the contact type towards picryl chloride or 2 : 4-dinitrofluorobenzene. Such sensitivity can therefore be effected not only by simple chemicals of low molecular weight but by a material which must be regarded as a typical antigen.

Features which, in general, seem to separate skin sensitivity to simple substances from most other phenomena of hypersensitivity are the failure to find circulating antibodies capable of sensitizing the skin passively, and the fact that hypersensitivity has been achieved mainly by application to the dermis. In the present experiments the effect has been obtained by the intraperitoneal route using protein conjugates free from the simple active substance. The antigenic activity of the conjugates used was demonstrated by development of the anaphylactic state and it is difficult not to attribute the skin effect also to some sort of antibody formation. The possibility that sensitization could be explained by the splitting off of picric acid from the picryl conjugate was ruled out by showing that g. pigs sensitized intraperitoneally by picryl stromata were not sensitive to picric acid.—H. H. Green.

I. Rose, B., & Browne, J. S. L. (1941). **Studies on the Release of Histamine from the Blood Cells of the Rabbit by the Addition of Horse Serum or Egg Albumin in vitro.**—*J. Immunol.* **41.** 403–408.

II. Rose, B., & Browne, J. S. L. (1941). **Effect of Histaminase Pretreatment on Histamine Shock in Guinea Pigs.**—*Ibid.* 409–412.

III. Rose, B. (1941). **Studies on the Histamine-Content of the Blood and Tissues of the Rabbit during Anaphylactic Shock.**—*Ibid.* **42.** 161–180.

I. A definite increase was observed *in vitro* in the histamine content of plasma from nine rabbits sensitized with horse serum and seven sensitized with egg albumin, when 5 ml. of heparinized blood from each animal were added to 0·2 ml. of either horse serum or 3% egg albumin and incubated for 20 min. The increase in histamine was greatest when the specific antigen was added, but an increase also occurred after addition of a nonspecific antigen as compared to the histamine content of the plasma of blood mixed with saline. The plasma of blood from unsensitized rabbits also had a higher histamine content after mixing and incubating with either egg albumin or horse serum; of these two substances egg albumin produced the greater release of histamine. These results support the theory that histamine may be released into the plasma during anaphylactic shock in the rabbit.

II. The intravenous injection of histaminase in 15 g. pigs 15 min. before the intra-abdominal injection of histamine failed to protect the animals against histamine shock and 14 of the animals died. Out of 16 control animals not previously treated with histaminase, 11 died. The time of onset of symptoms and death was not significantly different in the pre-treated as compared with the control group. These results do not confirm those of Karady & Browne [*V. B.* **10.** 446.] who found that previous treatment with histaminase protected g. pigs against histamine shock.

III. Experiments designed to investigate the fate of histamine during anaphylactic shock in the rabbit are described. Animals weighing 1·8–2·5 kg. were used and were sensitized to either horse serum or egg albumin by four intra-abdominal injections of 2 ml. each given at two-day intervals. The anaphylaxis investigations were carried out 2–4 weeks after the

last sensitizing dose of the antigen. A marked and rapid diminution of the white cell count and of the histamine content of the whole blood was observed in all the sensitized animals after intravenous injection of the specific antigen. The changes in the histamine level of the plasma were less marked; there was a slight increase immediately after the injection of the antigen followed by a moderate decrease. There did not appear to be any correlation between these changes and the severity of the symptoms of anaphylaxis. Determination of the histamine content of the tissues showed a definite decrease in the lung and spleen of shocked animals compared with similar tissues from controls. In non-sensitized rabbits there was little or no change in the histamine content of the blood after intravenous injection of horse serum and a leucopenia sometimes occurred, but after injection of egg albumin there was a decrease in both the blood histamine and white blood cell count. When histamine shock was induced in rabbits by a subcutaneous injection of 5 mg. of histamine per kg. body weight, a marked increase in the histamine content of the plasma was observed together with a moderate leucopenia and a moderate decrease in the histamine content of the blood. These results differ from those observed during anaphylactic shock. When anaphylaxis was superimposed on histamine shock the plasma histamine was markedly increased after injection of the histamine, and then rapidly decreased after the superimposed injection of the antigen, thus demonstrating that some mechanism exists for the removal of large amounts of histamine from the plasma. It is pointed out that the only common findings present in both histamine shock and anaphylaxis in the rabbit are the decrease in the histamine content of the whole blood and the leucopenia. The results indicate that histamine metabolism is altered in some way during anaphylactic shock in the rabbit but they do not establish that histamine is one of the basic factors responsible for the production of symptoms of anaphylaxis.—R. A.

LÜHRS, E. (1941). Einfluss der Kaliumsalze auf die Komplementbildung. **[Influence of Potassium Salts on Complement Formation].**—*Arch. wiss. prakt. Tierheilk.* **76.** 352–355.

The quantity of complement decreases in the serum of g. pigs fed on a mineral-deficient diet. L. states that the addition of KCl or NaCl prevents this fall, but that the addition of phosphoric acid to the food produces an even greater fall than in the controls. [The evidence in support of this statement is not very convincing.]—JOHN FRANCIS.

COLWELL, C. A., & YOUMANS, G. P. (1941). **The Relationship between Constant-Antiserum and Constant-Antigen Optimal Ratios Obtained with Rat and Guinea-Pig Precipitin.**—*J. Immunol.* **42.** 79–89.

By fine tests on antisera from rats and g. pigs immunized with sheep serum, it was found that approximately 1·6 times as much antiserum was required in precipitin tests for the constant-antigen optimum as for the constant-antiserum optimum, a factor which is similar to that of rabbit antiserum for crystalline ovalbumin. Rabbit antisera for sheep serum were tested, but there was no constant relationship between the constant-antigen optimal ratios and the constant-antiserum optimal ratios. It is suggested that the rat and the g. pig produce precipitins for fewer antigens of sheep serum than does the rabbit; they appear to respond mainly to the water-insoluble globulin and to the albumin fractions.—E. COTCHIN.

NIGG, C., CROWLEY, J. H., & WILSON, D. E. (1941). **The Use of Chick Embryo Tissues and Fluid as Antigens in the Complement Fixation Reaction in Influenza.**—*J. Immunol.* **42.** 51–70.

Inoculation into the chorio-allantoic sac on the 11th to 12th day gave the best yield of virus and complement fixing antigen. Complement-fixation tests in which mouse-lung living suspensions and various embryonic tissues of the developing chick were compared, showed that embryonic fluid was the antigen of choice on the basis of potency, yield, specificity, physical properties, and ease of production. The possible use of chick-embryo fluid as an antigen in precipitin tests is under investigation.
—JOHN FRANCIS.

GOODNER, K. (1941). **Collodion Fixation: A New Immunological Reaction.**—*Science.* **94.** 241–242.

The collodion particle technique [see CANNON & MARSHALL—*V. B.* **11.** 380, and WEIR—*V. B.* **12.** 93.] was studied with the object of devising an *in vitro* reaction for the detection of small amounts of virus. The underlying principle of the technique is that if

antibody is adsorbed on the surface of collodion particles the size of the antibody is artificially increased and an agglutination or precipitin reaction with antigen is so magnified. In the same way if antigen is adsorbed on the particles, sensitivity for detection of antibody is increased. Since the antigen-antibody complex is more remarkable for adsorption phenomena than either antigen or antibody, experiments were undertaken to see whether the freshly formed complex would adsorb, or be adsorbed by, collodion particles, thus magnifying immunological reactions. In studying the anti-pneumococcus system, 0·1 ml. of collodion suspension (of density such that 1 : 10 dilution matched No. 3 on the McFarland scale) was added to 0·5 ml. of varying dilutions of capsular polysaccharide, 0·1 ml. of antiserum added, the volume brought to 1 ml. by adding 0·3 ml. of saline, and the reaction read after one hour. Whereas the limit of the direct precipitin reaction was 10^{-5} or 10^{-6} antigen dilution, the limit by the collodion particle agglutination technique was increased to 10^{-10} for horse antipneumococcus type I. For antipneumococcus rabbit serum the reaction was sharpened by the enmeshment of collodion particles, but there was no enhancement of limiting dilution.

In studying virus-antivirus systems, readings were taken after leaving overnight in an ice-box, 1 : 100 dilutions of virus material from chick embryos being used. Good results were obtained in typing influenza virus and in determining the presence of antiviral antibodies in human serum from convalescent yellow fever.

It is stated that species derivation of serum in virus systems may be very important, *e.g.* human and goat sera have given positive results where monkey and rabbit sera failed.—H. H. G.

PETTERSSON, A. (1940). Die antinegataktische Immunität gegen die eitererregenden Staphylokokken. **[Anti-Negatactic Immunity against Pus-Causing Staphylococci]**.—*Z. ImmunForsch.* **98.** 348–359.

Preparations of acetone-treated staphylococci, or a filtrate of culture fluid, produced active antisera in rabbits which protected against intrapleural inoculation of several lethal doses of staphylococci. An antiserum prepared in a cow contained only 1 : 30 of the anti-haemotoxin of a commercial serum, but was in no way inferior in protective action. The activity, which was in the euglobulin fraction, was ascribed to the anti-negative-chemotactic (antinegatactic) action of the serum [see also *V. B.* **11.** 536].—J. G. CARR.

OERSKOV, J. (1940). Infektionsmechanische Untersuchungen über unspezifische, lokale, gesteigerte bzw. herabgesetzte Resistenz (Promunität bzw. Mucin). **[Investigations on the Mechanism of Infection in relation to Increased or Lowered Nonspecific Local Resistance]**. —*Z. ImmunForsch.* **98.** 359–372.

The nonspecific increase in the resistance of mice to intraperitoneal inoculation of several lethal doses of *Bacterium shigae*, which is produced by intraperitoneal inoculation of dead *Bact. coli* 24 hours previously, is due to an increase in numbers or activity of the phagocytes which prevents the extracellular lysis of the bacteria. It is the liberation of toxin by this lysis which kills the mouse. By heating *Bact. shigae* to 60°C. for 30 min., some of the toxin is released, and so promunity against heated *Bact. shigae* is not found.

Pre-treatment with mucin produces a promunity. But if it is given at the same time as the infecting dose, it reduces the susceptibility of the host by its inhibiting effect upon phagocytosis. Small amounts of mucin have a paradoxical action in that the primary growth of the bacilli is aided, and these bacilli are later removed by phagocytosis without lysis and liberation of toxin occurring. The animal may therefore survive a lethal dose.—J. G. CARR.

I. KAHN, M. C. (1941). **Bacteriostatic Properties of Histiocytes Toward *Mycobacterium tuberculosis* as Determined by the Single Cell Method.**—*Proc. Soc. exp. Biol., N.Y.* **46.** 630–634.

II. KAHN, M. C. (1941). **Mobility Velocities of Histiocytes from Normal and from Sensitized Guinea Pigs.**—*Ibid.* 635–638.

I. *In vivo* phagocytosis of *Mycobact. tuberculosis* was experimentally produced in the peritoneal cavity of many normal g. pigs, and by means of micro-manipulation and subsequent inoculation of Corper's egg medium with infected histiocytes, the viability of the engulfed tubercle bacilli was estimated. The aggregation of histiocytes as a response to alcuronate, was allowed to proceed in the animal for three days, then a heavy homogeneous suspension of the human type of *Mycobact. tuberculosis* was injected into the prepared area of the peritoneum ; after allowing *in vivo* phagocytosis to

proceed for one day, the peritoneal fluid was collected. Histiocytes composed at least 90% of the visible cells, and on the average 34·8% had engulfed varying numbers of organisms.

101 tubes of Corper's egg medium were heavily inoculated with infected histiocytes, but only 2% revealed subsequent growth of *Mycobact. tuberculosis*, whereas small numbers of free bacilli grew well. It is concluded that the histiocytes of the normal g. pig are capable of exerting some bacteriostatic influence on engulfed *Mycobact. tuberculosis* of the human type. No fragmentation within the cells was seen suggesting that the effect described may be due to disturbance of the metabolism of the organism.

II. Ten g. pigs were sensitized by means of the subcutaneous injection of 0·01 mg. of a living suspension of *Mycobact. tuberculosis* (human), which was prepared by Corper's method. Nine animals reacted positively, and from these, histiocytes were collected in 25% sterile sucrose.

The mean electrophoretic mobility velocities of the histiocytes in the normal and sensitized animals were respectively 3·82 and 4·32 sec. The slower rate of the infected cells may indicate a difference in surface charge.—J. K.

BIRKHAUG, K. (1939). **Allergy and Immunity (Iathergy) in Experimental Tuberculosis. V. Variations in Leukocytes in BCG-Immunized Guinea pigs Reinfected in the Allergic and Desensitized (Iathergic) State.**—*Acta paediatr. Stockh.* **26.** 66–85. [In English]. [For previous parts, see *V. B.* **10.** 599].

Total and differential leucocyte counts were made in allergic and desensitized groups of 28 BCG-immunized, and a control group of 28 non-immunized, g. pigs before and after subcutaneous injection with highly virulent live bovine tubercle bacilli, in order to elucidate the part played by tuberculin hypersensitivity in the pathogenesis of experimental TB. From an analysis of his results, B. concluded that the variation in leucocytosis alone was insufficiently clear-cut reliably to indicate the degree of tuberculous activity, the leucocytic index being of greater value, and that the monocyte : lymphocyte ratio was a more constantly sensitive criterion for pathological interpretation than the neutrophile : lymphocyte ratio and the neutrophile "shift to the left". The monocyte : lymphocyte ratio and the leucocytic index were considered to furnish reliable evidence that careful tuberculin desensitization significantly retarded the pathological activity of virulent bovine tubercle bacilli in BCG-immunized g. pigs.—R. O. MUIR.

CUMMINS, S. L. (1941). **The Intra-Tracheal Inoculation of Anthracite Dust Mixed with Dead Human Tubercle Bacilli into Rabbits.**—*J. Hyg., Camb.* **41.** 101–104.

When anthracite dust mixed with dead human type tubercle bacilli was inoculated intratracheally into several rabbits, marked lesions were observed, consisting of large masses of epithelioid cells and giant cells surrounding the areas of anthracite dust. When anthracite dust alone or dead tubercle bacilli alone were similarly inoculated, no such cell accumulations were found. The possible reason for the reaction is discussed.—J. P. G.

BOBALIĆ, M. (1940). Postoji li paralela izmedu titra vrbančevog seruma i aglutinacije "in statu nascendi" bacila vrbanca u bouillonu sa pridodatkom vrbančevog seruma, i da li je na temelju te aglutinacije dpoustiv zaključak na njegov titar? [**Is there a Parallel between Agglutination of the Swine Erysipelas Bacilli *in statu nascendi* in Broth by Immune Serum and the Titre of such Serum? Is the Reaction an Indication of the Titre of the Serum?**]—*Vet. Arhiv.* **10.** 608–625. [Abst. from German summary].

Forty out of 50 samples of swine erysipelas antisera were shown to correspond closely in their "biological activity" [method of test not stated in summary] and their agglutinating power for the organism. It was concluded that the latter is not a sufficiently accurate guide to biological activity to be generally adopted.

PAVIČIĆ, D. (1940). Aglutinacija B. erysipelatis suis in statu nascendi i njena upotrebivost za tipizaciju toga mikroba. [**Agglutination of *Erysipelothrix rhusiopathiae in statu nascendi* and its Use in Typing the Organism**].—*Vet. Arhiv.* **10.** 130–138. [Abst. from German summary].

Using cultures of *E. rhusiopathiae* and samples of swine erysipelas antisera, singly and mixed, P. found that no specificity between different strains or samples of antisera could be demonstrated. All the antisera agglutinated

the organism, roughly to an extent corresponding to their therapeutic value. There was, however, no close connexion between the virulence and agglutinability of the cultures.

BRONSON, L. H., & PARKER, R. F. (1941). **Neutralization of Vaccine Virus by Immune Serum. Titration by Means of Intracerebral Inoculation of Mice.**—*J. Immunol.* **41.** 269–278.

It was found that virus could be titrated satisfactorily by intracerebral inoculation of mice, and that with the strains of virus used the results agreed with those obtained by rabbit inoculation. Addition of immune serum to the virus suspensions protected mice from infection, the degree of protection being proportional to the concentration of serum.

—JOHN FRANCIS.

JUNGEBLUT, C. W. (1941). **Studies on the Inactivation of Diphtheria Toxin by Vitamin C (*l*-Ascorbic Acid).**—*J. infect. Dis.* **69.** 70–80.

Results obtained in g. pigs are given which demonstrate that diphtheria toxin is inactivated by direct contact with vitamin C; the detoxification is independent of the acid nature of the vitamin, but a certain minimum time of contact, 10–20 min., was necessary for destruction of the toxin. Inactivation of the toxin occurred over a certain range of concentrations of ascorbic acid, but did not follow the law of multiple proportions and was limited to comparatively small doses of toxin and ascorbic acid. Detoxification was enhanced by the addition of cupric ions. It is suggested that this indicates that the ineffectiveness of excessive doses of ascorbic acid was related to an insufficiency in the amount of catalysing agent which is concerned with the autooxidation of ascorbic acid. It is demonstrated that hydrogen peroxide exerts a marked detoxifying effect on the toxin, and this is regarded as support for the concept that the substance responsible for inactivation is a peroxide. The results of tests on the effect of vitamin C on *in vivo* diphtheritic intoxication showed that ascorbic acid may occasionally protect g. pigs which have received a lethal dose (1·5 m.l.d.) of toxin, but it had no effect when given with subtherapeutic doses of antitoxin after higher lethal doses of toxin. Also administration of vitamin C and of B_1 had no preventive effect on the development or the course of post-diphtheritic paralysis.—R. A.

BARNES, J. M., & TRUETA, J. (1941). **Absorption of Bacteria, Toxins and Snake Venoms from the Tissues. Importance of the Lymphatic Circulation.**—*Lancet.* **240.** 623–626.

One leg of six anaesthetized rabbits was prepared so that no lymph drained from it; 0·03 ml. of a thick suspension of *Pseudomonas pyocyanea* in saline was injected subcutaneously in the "ankle" in one animal, into the knee joint in another, and in the other four it was placed in a deep, freshly made wound in the muscles of the calf. Six control animals received the bacteria by the same routes as the experimental animals. The results showed that the bacteria were not taken up by the freshly injured blood vessels, nor did they appear in the circulation of the animals whose lymphatics were obstructed, but only appeared in the circulation when lymph drainage from the area was uninterrupted. Similar experiments on other rabbits showed that black tiger snake venom, Russell viper venom, diphtheria toxin, and tetanus toxin, all with molecular weights of over 20,000, were not absorbed from limbs whose lymphatics were obstructed nor from limbs completely immobilized in plaster. But cobra venom, with a mol. wt. of under 5,000, like strychnine, was absorbed with equal rapidity from normal limbs, from limbs whose lymphatics were obstructed, and from immobilized limbs. As it is known that no lymph will flow from an immobilized limb, the effect of immobilization on the absorption of these venoms and toxins of high mol. wt. is explained by the assumption that they are carried from the tissues to the bloodstream only by the lymph, while substances of lower mol. wt. such as cobra venom and strychnine enter the bloodstream immediately.

Some of the factors governing the production and flow of the lymph, particularly the part played by muscular movements and inflammation, were investigated on dogs. It was shown that approximately isometric contractions of muscles produced only a very small flow of lymph and therefore the increased flow during exercise is not accounted for by the increased metabolic activity of the muscle. It was confirmed that in oedema the production and flow of lymph was greatly increased, but when inflammatory oedema was prevented from developing and complete immobilization was

secured by enclosing the injured limb in plaster, the lymph flow was substantially reduced. The reduction of the lymph flow obtained by this means was even greater when local drainage of the inflamed part was provided by incisions.—R. ALLCROFT.

I. KÖVES, J., & HOFFMAN, F. (1941). Wie lange verweilt eingespritzte Immunserum im Tierkörper. [**How Long Does Injected Immune Serum Last in the Body?**]—*Arch. wiss. prakt. Tierheilk.* **76.** 173–192.

II. KÖVES, J., & HOFFMAN, F. (1941). Ueber den Wirkungsgrad der Immunsera zu verschiedenen Zeitpunkten nach der Einspritzung. [**The Intensity of Action of Immune Serum at Different Times after Injection**].—*Dtsch. tierärztl. Wschr.* **49.** 73–75.

I. Fowl cholera antiserum or diphtheria antiserum was injected into various animals by different routes and the antibody content of the blood studied by *in vitro* methods. There were considerable variations in the results but general conclusions were drawn and these, together with the practical applications of the work, are summarized in II.

II. The antibody concentration curves show that following intravenous inoculation maximum titres are reached at once, but that following subcutaneous or intramuscular inoculation absorption is delayed. The maximum titre was reached in two days in young pigs, in 2–3 days in sheep 1–2 years old, and in five days in horses 7–10 years old. The results following s/c or i/m inoculation were the same. It is suggested that both the rate of absorption and of elimination of serum depend on the metabolic rate of the animal. For an immediate curative effect, particularly in cattle or horses, serum must obviously be injected i/v. [The rate of absorption following intraperitoneal inoculation was not studied.]

The general assumption that serum exerts a protective effect for 2–3 weeks is often wrong. Following i/v injection the loss in the first 24 hours may be as much as 25–35%, but then the decrease becomes less and there is a regular daily percentage loss, *i.e.*, the amount of serum lost depends on the amount present in the animal body. The daily rate of loss of homologous serum is said to vary from 5–10% in horses and swine. When horse serum is injected into swine the daily loss is 10–15%, but in sheep and cattle it is 5–10%. There is a table showing the amount of serum remaining at various intervals following i/v inoculation of 2–100 ml. amounts, when the daily loss is 5, 10, or 12%. Various examples are given of how this table could be used in swine practice. [The table would probably be a very useful guide, but there is obviously much variation between individuals and no account is taken of the slow rate of absorption following i/m or s/c inoculation. The right-hand column of this table should be headed 12%, not 10%.]—J. F.

FLÜCKIGER, G. (1941). Versuche mit neuzeitlichen Immunisierungsmethoden gegen Schweinerotlauf und -pest in der Schweiz. [**Trials of Modern Immunization Methods against Swine Erysipelas and Swine Fever in Switzerland**].—*Schweiz. Arch. Tierheilk.* **83.** 82–95.

Swine erysipelas.—A method brought out by BÖHME in 1923, but found to be inefficacious, is referred to, as well as KONDO's method with avirulent culture obtained by growing the organism on medium containing trypaflavine [*V. B.* **3.** 290]. The Swiss authorities obtained a strain from Japan and tested Kondo's method on mice, pigeons, and swine. These tests gave promising results and Swiss veterinary institutes and practitioners are invited to test the method in practice.

Swine fever.—Up to the present time the Federal Veterinary Office has not allowed the general use of the serum-virus method, owing to the dangers of spread of the disease thereby.

Experiments were carried out on a moderate scale on the production of a reliable antiserum and virus strain for possible use in the country. Three virus strains, one Swiss, one Italian and one Hungarian and antiserum of Hungarian origin were tested on small groups of pigs and satisfactory results were obtained with the serum used in conjunction with the Italian or Hungarian virus: the Swiss virus was, however, too virulent. The method, using a suitable virus, is approved for use in selected areas. It is stated, however, that Swiss conditions of pig keeping are such as to favour rapid spread, should any error in application of the virus be made, or animals be carelessly selected for immunization.—J. E.

PARASITES IN RELATION TO DISEASE [ARTHROPODS]

SANKARANARAYAN, N. S. (1941). **Flies and their Control in Cattle Farms and Dairies.**—*Indian vet. J.* **18.** 75–92.

A short account of fly control, mainly of *Musca domestica* and *Stomoxys calcitrans*. The breeding habits of these species are briefly dealt with. Methods for the prevention of breeding of the flies are described.—S. K. SEN.

*IWANOFF, X. (1939). [**Linguatulosis in Goats in Bulgaria**].—*Jb. Vet. med. Fak. Sofia.* **14.** 231–300. [In Bulgarian]. [Abst. from abst. in *Jber. Vet.-Med.* **66.** 151].

An examination of the jejunal lymph nodes of 200 goats 1–10 years old showed that 78% were infected without any age discrimination. Considering the less favourable chances of infection in goats than in sheep (goats dispersed on wooded hillsides and absence of dogs), this high degree of parasitism is remarkable. It is stated that in sheep in Bulgaria an infection rate of 98·25% has been found. In goats a heavy invasion of up to 60 living last-stage larvae per gramme of lymph-node tissue has been found.

PARASITES IN RELATION TO DISEASE [HELMINTHS]

MALKANI, P. G., & PRASAD, G. (1941). **Nasal Schistosomiasis in Goats.**—*Indian J. vet. Sci.* **11.** 73–77.

The authors record from Bihar two cases of nasal schistosomiasis in goats produced by *S. nasalis*. P.M. lesions, morbid histology, and symptoms of the disease are described. Adult schistosomes were recovered from the liver and lungs of one infested animal. Schistosome eggs were absent from urine and faeces of this animal.—G. D. BHALERAO.

WADOWSKI, S. (1938). Parafasciolopsis fasciolaemorpha Ejsm. 1932 u sarn. [*P. fasciolaemorpha* **in Kids**].—*Pam. pańs. Inst. nauk. Gosp. wiej. Pulawy.* No. 2. 91–95. Suppl. to *Wiad. weteryn.* **18.** No. 223. [Abst. from French summary].

Fourteen specimens of *P.f.* [originally described from an elk in Poland] were found in the liver of a kid from the Pinczow region. A table gives the measurements of ten of the worms.

KRULL, W. H. (1941). **The Number of Cercariae of *Fasciola hepatica* Developing in Snails Infected with a Single Miracidium.**—*Proc. helminth. Soc. Wash.* **8.** 55–58.

Of 21 snails, *Pseudosuccinea columella*, exposed to infection with a single miracidium of *F. hepatica*, eight became infected. Rediae and, in one case, rediae and cercariae were observed through the transparent shell 57 days after infection. The largest number of cercariae produced by any of the snails was 629, of which 613 were discharged. The shedding period ended always in the death of the snail, except one which lived for 24 days after the last cercaria escaped. Although all snails were infected on the same day, there was a difference of 21 days in the time elapsing before the first cercariae were shed. Most of the snails were dissected when their behaviour indicated that death would occur in a day or so, and the disposition of living rediae and cercariae in the viscera was studied.—M. L. BINGHAM.

BACHLECHNER, K. (1941). Beitrag zur Rinderfinnenbekämpfung in der Ostmark. [**Control of Bovine Cysticercosis in Austria**].—*Wien. tierärztl. Mschr.* **28.** 1–7.

From abattoir records it is estimated that 0·2–0·3% of cattle in Austria are infested with *C. bovis*. Since 1938 it has been difficult to trace the origin of slaughter cattle, but for some years prior to 1938 this was possible and statistics are quoted showing the origin of "measled cattle" slaughtered at the St Marx abattoir, Vienna. A map shows the distribution of the centres of infection. The desirability of prosecuting an energetic campaign against the parasite is stressed.

The laws regulating insurance against "measled" beef can operate unfairly against the farmers, since an animal may have become infected many weeks before slaughter yet liability falls on the owner of the farm where the animal spent the 14 days prior to slaughter.

B. advocates the tracing back of "measled" cattle so that tapeworm carriers can be detected and treated. The annual loss from "measles" in the German Reich is estimated at 1 million

RM. so that measures to detect the carriers, though laborious, would be repaid. Cases were seen in young calves as well as in adults and although the cysts were immature it was equally necessary to trace their origin.

In areas where facilities for cold storage did not exist the infested meat could be rendered safe by adequate pickling, as prescribed by current meat inspection laws.—H. E. HARBOUR.

KELLER, H. (1941). Wandel und Stand der Untersuchungen über die Gesundheitsschädlichkeit der Muskelfinnen des Schafes und Rehes. **[Present Knowledge on the Danger to Health of Muscle Cysticerci in Sheep and Roe Deer]**.—*Z. Fleisch- u. Milchhyg.* **51.** 102–105.

K. points out that prior to the researches of RANSOM (1913), muscle cysticerci in sheep were identified as *C. cellulosae* or *C. tenuicollis*. Since Ransom's work was published it has been generally accepted that *C. ovis* is a distinct species, the adult stage being *Taenia ovis* in the dog. No conclusive proof has been obtained of the existence of *C. cellulosae* in sheep, and it is noted that in districts badly affected with pork "measles" cysticerci in sheep are few. In K.'s opinion it is almost certain that *C. cellulosae* does not occur in sheep. *C. ovis* is not dangerous to human health.

C. capreoli is the species infesting roe deer and it has not been proved that *C. cellulosae* infests this animal.—H. E. HARBOUR.

VAIDYANATHAN, S. N. (1941). *Capillaria bovis* **Schnyder, 1906 from the Intestine of a Calf at Madras.**—*Indian J. vet. Sci.* **11.** 94–97.

The author makes a few observations on the anatomy of the specimens of *C. bovis* collected.
—G. D. BHALERAO.

CARTA, A. (1939). Particolari alterazioni epatiche del cane da uova di parassiti del genere Capillaria. **[Liver "Lesions" in a Dog Caused by the Presence of** *Capillaria* **Eggs]**.—*Nuovo Ercol.* **44.** 368–373.

In the liver of a dog which was destroyed because of a malignant tumour, large numbers of nodular lesions were present, mostly in the peripheral parts of the lobes. They were surrounded by a fibrous capsule, sometimes partially caseous or calcified or organized. They were easily enucleated and on microscopic examination were found to be composed of masses of small ovoid bodies measuring $48–54\mu \times 28–32\mu$, having a double contour, operculated extremities, and a central granular mass. C. considers that they were *Capillaria* eggs.

A similar condition was described by PERRONCITO (1877), who suggested that the ovoid bodies were sporozoa, although later he admitted that they might be helminth eggs.
—MILLER WATSON.

TUKALEVSKIĬ, I. M. (1940). O biologicheskoĭ samostoyatel'nosti vidov Trichocephalus suis (Schrank, 1788) i Trichocephalus trichiurus (L., 1771). **[The Non-Identity of** *Trichuris suis* **and** *T. trichiura***]**. —*Med. Parasitol., Moscow.* **9.** 444–446. [Abst. from French summary].

Cross-infection of both man and swine can be obtained with the eggs of *T. suis* and of *T. trichiura* respectively, but in the body of the abnormal host neither parasite attains sexual maturity. T. concludes that this fact can be interpreted as showing the biological independence of these two species.

*FÓRISS, G. (1940). **[Method for Concentration of** *Ascaridia* **Eggs in Faeces]**.—*Közl. Oesszehas. élet- es kórtan Köréből.* **27.** 53. [Abst. from abst. in *Dtsch. tierärztl. Wschr.* **49.** 103].

Owing to the tendency of *Ascaridia* eggs to stick to faecal particles, the glycerin flotation method is unsuitable for egg-count purposes. A good method is to add to the faecal sample a mucus-dissolving substance such as 5% KOH or 12·75% crystalline Na_2CO_3 before proceeding with the flotation technique.

KARMANN, P. (1941). Ueber die Lungenwurmseuche der Schafe in der Rheinprovinz, im besonderen über den Nachweis der Lungenwurmlarven im Schafkot. **[Lungworm Disease in Sheep in the Rhine Province: Demonstration of Larvae in Faeces]**.—*Dtsch. tierärztl. Wschr.* **49.** 136–137.

K. briefly describes the symptoms of lungworm disease in sheep, which was particularly prevalent in the summer of 1940 in the Rhine Province. Most of the cases were due to *Dictyocaulus filaria*, the life-history of which is detailed. Methods used for the detection of larvae in the faeces are described but present no original features.—H. E. HARBOUR.

*WALTER, H. (1939). Untersuchungen über die Widerstandsfähigkeit von Larven verschiedener Strongyliden beim Schaf. **[The Viability of Larvae of Some Sheep Strongyles].** — *Inaug. Diss., Hanover.* [Abst. from abst. in *Berl. Münch. tierärztl. Wschr.* Jan. 17th. 33. (1941)].

The results are given in tables [in the original], from which the following general findings emerge. Resistance to desiccation of the larvae of various strongyles varies considerably, *Bunostomum* being least and *Trichostrongylus* most resistant with survival times of about three days and four months respectively. Copper sulphate solution was not effective as a lethal agent against *Haemonchus* or trichostrongyles. Artificial fertilizers dissolved in water had also a very poor lethal action, calcium cyanamide in solid form alone having marked toxicity. It is concluded that these substances cannot be regarded as of any value as larvicides in the form and manner in which they are applied to farm land. [Calcium cyanamide, however, in soil or manure, breaks down into urea and other substances having a high degree of anthelmintic action.]

" Viscojod " [evidently an iodine compound] had a good lethal action against strongyle larvae, killing them in a few minutes at a strength of 1%.

Urine of cattle was, however, the best strongyle larvicide of all.

ROGERS, W. P. (1940). **The Physiological Ageing of the Infective Larvae of** *Haemonchus contortus.*—*J. Helminth.* **18.** 183–192.

Because of the importance of TAYLOR's method [*V. B.* **10.** 769.] of estimating pasture infestations, R. thinks it necessary to select from among the larvae collected from the herbage those capable of infecting animals, before a true estimation of the danger of the pasture can be made. It is therefore suggested that the physiological aging of trichostrongyle larvae should be examined.

About 20,000 young infective forms of *Haemonchus contortus* from sheep faeces were collected and placed in each of three petri dishes in water and stored at 7°C., 24°C., and 37°C. respectively. At intervals from the second to the seventh weeks, larvae were taken from the dishes and examined for activity, infectivity, and fat content. Goats were used to estimate the infectivity of the aging larvae but subsequent worm counts showed that these animals were highly resistant to *H. contortus* infestation. The activity was estimated by counting the number of moves per minute made by 20 haphazardly selected larvae from each of the three sources. Fat content of exsheathed larvae was estimated visually after staining with Sharlach R. The fat in young larvae was evenly distributed throughout the cells of the mid-intestine, but as the larvae aged the band of fat in the intestine became more elongated and narrow. In very old larvae little fat was found. The relationship between fat content, activity, and infectivity was fairly close in rapidly aged larvae, but in slowly aged larvae the infectivity fell more rapidly than the other factors. When the line of fat along the intestine was well marked and broad, and the activity was over 70 moves per minute at 30°C., the infectivity was found to be comparatively high. Low infectivity was associated with an activity of less than 40 moves per minute and the presence of smaller and separated fat globules.—R. ALLCROFT.

OTTO, G. F. (1941). **Further Observations on the Immunity Induced in Dogs by Repeated Infections with the Hookworm,** *Ancylostoma caninum.*—*Amer. J. Hyg.* Sect. D. **33.** 39–57.

In a previous paper, OTTO & KERR [*V. B.* **9.** 634.] showed that dogs given graded doses of living hookworm larvae subcutaneously over a period of 5–7 months were thereafter refractory to test infections of 120,000–200,000 larvae given in the same manner, such doses usually causing death of previously uninfected control animals.

O. has now carried out an elaboration of McCOY's [*V. B.* **2.** 561.] method of *per os* infection by graded doses. Test infections were given *per os* or subcutaneously following immunization *per os*, and in both cases an effective immunity was produced in animals which survived the " crisis " of the immunizing infections. The immunity produced is, therefore, general and not local.

A further series of experiments was undertaken to determine whether the process of immunization could be accelerated if the extensive blood loss due to the activities of adult worms in the intestine could be prevented. For this purpose, dogs were dosed with tetrachlorethylene once a week throughout the course of immunizing infections, and again on

the day on which the test infection was administered. It was found that the periodic removal of the developing worms did not materially affect the development of immunity, but did prevent the development of a fatal anaemia. There was, however, no evidence that development of immunity was retarded in animals which were allowed to become anaemic, since such animals, even if they died of the anaemia, frequently showed immunity of a highly protective order, as evidenced by the small numbers of worms recovered P.M. from the intestine.—E. S.

ROGERS, W. P. (1940). **The Occurrence of Zinc and Other Metals in the Intestines of *Strongylus* spp.**—*J. Helminth.* **18.** 103–116.

Analysis of the intestines and intestinal contents of numbers of *S. edentatus* and *S. vulgaris* demonstrated the presence of zinc, copper, silver, iron, and sulphur. Zn was present in the greatest amount, a maximum of 0·58 mg. per worm being found. The amount of S present indicated that Zn was probably present as the sulphide. Analysis of those regions of the mucosa of the horse where the parasites were most frequently found showed the presence of Zn and Cu; a maximum of 9·05 mg. per 100·2 g. of mucosa was found. The amounts of mucosa which would have to be ingested to provide the quantities of Zn found in the worms were calculated.—R. A.

ROGERS, W. P. (1940–41). **Digestion in Parasitic Nematodes. I. The Digestion of Carbohydrates. II. The Digestion of Fats. III. The Digestion of Proteins.** —*J. Helminth.* **18.** 143–154; **19.** 35–46 and 47–58.

I. The saccharogenic and amylolytic enzyme activities of extracts from different sections of the intestines of *Strongylus edentatus* and *Ascaris lumbricoides* were examined and the influence observed on them of H-ion concentration and addition of various salts, *viz*, sodium nitrate, sodium chloride, sodium sulphate, disodium hydrogen phosphate, potassium iodide, and sodium bicarbonate. It is claimed that KI was most effective in promoting the activity of *S. edentatus* amylase while $NaHCO_3$ was most effective in the case of *A. lumbricoides*; NaCl did not activate the enzymes to any extent, but Na_2HPO_4 was fairly effective in both parasites. Amylolytic and saccharogenic activity was greatest at pH 9·4 for extracts from *A. lumbricoides* and at pH 8·0 for *S. edentatus*. It is concluded that the amylolytic enzymes of the two nematodes are distinct from each other and from that of their hosts. R. thinks that the situations of the parasites in their hosts are such that the reaction of host juices ingested would give optimum conditions for the action of the parasites' carbohydrate-splitting enzymes.

II. In a continuation of the investigations on digestion the same species of worms were used as in I to determine the presence and activity of lipolytic enzymes in the intestines of the parasites. Olive oil or ethyl butyrate and a buffer solution were used as substrates for determining the enzyme activity which was found to be greatest at pH 8·0. The effects of added bile salts (sodium glycocholate and sodium taurocholate) and of sodium bicarbonate were investigated and R. claims that glycocholate and $NaHCO_3$ both activated the lipolytic enzymes of *A. lumbricoides*, while taurocholate had a retarding effect on the enzymes from both parasites and *S. edentatus* was unaffected by the addition of $NaHCO_3$. Esterase action relative to lipase action was 2½ times greater in *S. edentatus* than in *A. lumbricoides*. It is concluded that the lipolytic enzymes in *S. edentatus* differ from those of its host and from those of *A. lumbricoides*.

III. The nature and comparative activity of the proteolytic enzymes of the same two parasites were investigated using gelatin, blood albumin, and casein as substrates at different H-ion concentrations; optimum activity was obtained at pH 6·2. The proteases secreted by the two nematodes appeared to be tryptic in nature rather than peptic. The amount of protease extracted from a given weight of *S. edentatus* was much greater than that from a similar amount of *A. lumbricoides*. The process of the digestion of haemoglobin was examined spectroscopically; the first change was the formation of reduced haemoglobin which proceeded most rapidly at higher H-ion concentrations, followed by the formation of haematin. [The evidence for some of these conclusions is not clear from the data given.] —R. ALLCROFT.

I. *HEMKER, H. (1940). Ein Beitrag zur Aetiologie der Sommerwunden. **[The Aetiology of "Summer Sores"].**— *Inaug. Diss., Hanover.* [Abst. from

abst. in *Berl. Münch. tierärztl. Wschr.* March 21st. 148. (1941)].

II. *Held, F. (1940). Ein Beitrag zur Therapie der Sommerwunden mit besonderer Berücksichtigung der Möglichkeit parasitärer Ursachen. **[Treatment of " Summer Sores ". The Possibility of Their Parasitic Causation]**.—*Inaug. Diss., Hanover.* [Abst. from abst. in *Berl. Münch. tierärztl. Wschr.* March 21st. 148. (1941)].

I. A review of the literature and a discussion on conditions in Germany, with special reference to the possible role of flies and nematode larvae.

II. Carbon tetrachloride local therapy as recommended by Friedrich (1937) proved to be the best, most rapid, and cheapest method when used on 14 army horses. The work threw no additional light on the problem of the cause of " summer sores ".

DISEASES, GENERAL

Uhlenhaut, F., Saco, T. R., Orlandini, O., & Vasquez, A. (1940). Principales enfermedades infecto-contagiosas y parasitarias que atacan al ganado en el Perú. **[Principal Infectious and Parasitic Diseases of Livestock in Peru]**. pp. 59 + 6. Lima: Sección Téchnica de Propaganda Agropecuaria.

This is a handbook for the use of stock-breeders and describes the cause, symptoms, prophylaxis, and cure of the more important diseases of animals in Peru. The diseases dealt with include anthrax, TB., blackleg, brucellosis, haemorrhagic septicaemia, mastitis (streptococcal), strangles, piroplasmosis and anaplasmosis, foot and mouth disease, equine encephalomyelitis, swine fever, fowl cholera, pullorum disease, avian coccidiosis, fowl pox, fascioliasis, tick infestation, lungworm disease, and mange.—Miller Watson.

Forsyth, A. A. (1941). **Grass Disease in a Coal Mine.**—*Vet. J.* **97.** 26–28.

Outbreaks are recorded of " grass disease " which occurred during 1927 among pit ponies in two collieries in South Wales. Ten of the animals died within four days after the first symptom had been noted. The source of the disease was attributed to hay which had been returned to a dealer after having caused similar losses in a London stud of horses. No more losses occurred in either colliery after the hay had been removed and the food store, feed bags, mangers, etc., had been thoroughly disinfected. No losses occurred when the hay was fed to cattle. Details are given of the cases.
—C. V. Watkins.

Videsott, R. (1939). Contributò alla patogenesi della mioglobinuria paralitica. **[Pathogenesis of Myoglobinuria Paralytica]**.—*Nuovo Ercol.* **44.** 3–29.

The author reviews present theories on the aetiology of myglobinuria and describes his own investigations.

He examined a number of horses immediately after the onset of the disease and found that there was no reduction of the alkaline reserve in the early stages. There was, however, reduction during the course of the disease and the author concludes that it is a result and not the cause of the disease. He claims that acidosis, when present, is largely due to muscular efforts provoked by pain. He also noted that the alkaline reserve was lowered when the animal became constipated and when the disease was more acute. There was some degree of hyperglycaemia in all cases studied.
—Miller Watson.

Casos, G. A. (1941). Enfermedad de los rastrojos. **[Cornstalk Disease of Horses and Cattle]**.—*Publ. misc. Direcc. Propaganda y Publ. B. Aires.* No. 95. pp. 4.

This is an account of the cause, symptoms, and treatment of cornstalk disease in the Argentine. The disease is sometimes confused with equine encephalomyelitis which is a disease of spring and summer whereas cornstalk disease occurs mainly in moist autumn weather and is common after the maize harvest when animals are fed on the cornstalks which have been lying wet.

The disease affects animals in two ways. A hyperacute form may cause death within a few hours, and the acute form is characterized by inappetence, staggering gait, subnormal temperature, amaurosis, colic, and nervous symptoms. The lesions include acute gastro-enteritis, sometimes with ulceration of the gastric mucosa, and necrotic foci in the cerebrum.—Miller Watson.

Stubbs, E. L., Love, W. G., & Live, I. (1941).

Periodic Ophthalmia and Studies on the Possible Relationship to Brucellosis.—*J. Amer. vet. med. Ass.* **99.** 142–144.

The authors describe periodic ophthalmia in a yearling colt whose dam had become blind from the same disease 8 months previously. During 11 months' observation, 11 attacks of the disease occurred, both eyes being affected on five occasions. In the later stages the acute attacks lessened in severity but merged almost into each other. During the last five months, several tests were made for brucellosis with negative results. The tests included the agglutination test, the "brucellergen" skin test of Huddleson, and skin and eye tests with a sonized filtrate of *Br. abortus*. None of these was positive until dead *Br. abortus* and, later, live *Br. abortus* had been injected intravenously. The former caused agglutinin production but no skin sensitivity while the latter produced skin sensitivity but no eye sensitivity. [Sonic filtrates are prepared by submitting suspensions of the organism to high frequency vibrations which are produced electrically and are outside the audible range.]—C. V. WATKINS.

MANSJOER, M. (1941). Een met oedemen gepaard gaande nieraandoenig bij een buffel. [**Oedema Associated with Kidney Disease in a Buffalo**].—*Ned.-ind. Bl. Diergeneesk.* **53.** 16–20. [English summary].

M. describes a case at Makale, South Celebes, in a buffalo which received salt in rather large quantities with its food or water. The principal symptoms were lack of energy, inappetence, muscular shivering, and later oedema in the limbs. There was also oliguria and diarrhoea, and pain in the region of the kidneys. Urine taken off with difficulty was brown and cloudy, alkaline, very albuminous, and contained leucocytes, erythrocytes, and cylindrical casts, demonstrating a grave and acute nephritis. Bacteriological investigations were negative. The animal recovered with symptomatic treatment. Theories of salt poisoning are discussed.
—L. TOBBACK.

GLÄSSER. (1941). Das Ende der Schweineseuche und die Bedeutung ihrer Nachfolgekrankheiten für Veterinärpolizei, Fleischbeschau und Forensis. [**The End of the Designation "*Schweineseuche*" and the Significance of its Successors in Official Veterinary Police, Meat Inspection, and Forensic Applications**].—*Dtsch. tierärztl. Wschr.* **49.** 634–637.

By an order of April 2nd, 1940, the disease designation "*Schweineseuche*" [which has usually been called "swine plague" in English] no longer exists as meaning a separate contagious disease transmissible between animals and between herds. It has lost its place as a distinct disease and no longer has a right to a place in the list of notifiable animal diseases. What was formerly regarded as *Schweineseuche* is now known, as a result of new knowledge acquired by research, to include a number of disease conditions. The old term "*akute Schweineseuche*" was applied to diseases which are now known to have been (1) swine fever, (2) fibrinous inflammation of serous and joint membranes, and (3) sporadic cases of septicaemic pasteurella infection, secondary to some form of injury *e.g.* chill [as in fowl cholera—see *V. B.* **12.** 138.]; and *kronische Schweineseuche* is either enzootic pneumonia or piglet influenza. G. describes these disease entities.
—J. E.

*AYGÜN, S. (1938). [**First Report on Investigations into an Infectious Disease of Unknown Origin in Goats in the Neighbourhood of Eskisehir, Turkey**].—*Türk Baytarlar Birligi Dergisi.* **8.** 6–15. [In Turkish]. [Abst. from abst. in *Jber. Vet.-Med.* **66.** 17].

A description of a purulent polyarthritis in goats, affecting most commonly the knee, hock, and joints of the foot. In one herd of 100 goats, 45 were affected. P.M. changes included purulent arthritis and tendonitis [presumably only where the tendons traversed joints], congestion of the kidneys, and sometimes petechiae on the endocardium and in the lungs. The disease was set up in goats by the intravenous injection of pus from affected joints. Diplococci were isolated from pus, but were not then studied bacteriologically.

HULL, F. E., & TAYLOR, E. L. (1941). **Abscesses Affecting the Central Nervous System of Sheep.**—*Amer. J. vet. Res.* **2.** 356–357.

Eleven case records of abscesses affecting the c.n.s. of sheep (seven lambs and four older sheep) are presented. When the cord alone was affected, posterior paralysis was the characteristic symptom, and this might be

sudden or gradual in onset. When the brain was affected there was complete paralysis and stupor, followed by loss of consciousness and death. It was found P.M. that abscesses along the spinal column affected principally the vertebral bodies and/or joints. Continued pressure of these abscesses on the cord caused degeneration of nerve elements. Brain abscesses were located either in the lateral ventricles or cerebellum. The content of the abscesses was usually a thick greenish-yellow pus, cultures of which either revealed *Corynebacterium pyogenes* or were negative.—N. J. SCORGIE.

*SKOVBJERG, E. (1941). Iagttagelser over Løbestrongylose og andre Sygdomme hos Faar. [**Experiences of Gastric Strongylosis and other Diseases of Sheep**].—*Maanedsskr. Dyrlaeg.* **52.** 573. [Abst. from abst. in *Skand. VetTidskr.* **31.** 163].

S. describes his experiences with a flock of sheep. Parasitic gastritis caused by *Haemonchus contortus* and *Ostertagia circumcincta* was successfully treated by direct injections into the abomasum of trichlorethylene (10 ml.) repeated at intervals of about one month.

Some lambs from the flock became affected with a paraplegic condition like " swayback ", which appeared to be preventable by dosing pregnant ewes with copper.

Sheep of the same flock were given soya meal and 30 out of 200 died as a result after a few days' illness ; icterus was a symptom.

*BARANOW, A. G. (1937). [**Defects in the Eyelids of Karakul Sheep**].—*Samml. wiss. Arb. Petrow. Forschungsstat. Woll- u. Milchschafz.* No. 2. pp. 29–34. [In Ukrainian]. [Abst. from abst. in *Berl. Münch. tierärztl. Wschr.* May 23rd. 258. (1941)].

The defect described consists of a nick or gap in the middle of the free border of the upper eyelid, so that the eye is more or less abnormally exposed. In severe cases blindness results from the consequent trauma.

*WICKE, K. (1940). Ueber den Spulwurmbefall und sonstige Fuchskrankheiten. [**Ascariasis and Other Diseases of Foxes**]. —*Inaug. Diss., Hanover.* [Abst. from abst. in *Berl. Münch. tierärztl. Wschr.* May 9th. 234. (1941)].

Ascariasis is a common cause of death in foxes under three months of age. Adult foxes carry the parasite and spread it by their excretion of the eggs. The next most important cause of loss in young foxes is *Salmonella enteritidis* infection, followed by lungworm infestation, wounds, enteritis, distemper, and leptospirosis.

*HEIN. (1940). Beobachtungen über Krankheiten und Missbildungen bei Sumpfbiberböcken. [**Diseases and Malformations in Nutria Bucks**].—*Dtsch. Pelztierz.* p. 185. [Abst. from abst. in *Berl. Münch. tierärztl. Wschr.* May 9th. 234. (1941)].

A description of urinary gravel and calculi and prolapse of the penis in nutria bucks.

*SCHOOP. (1940). Todesursachen und Gesundheitsstörungen bei Nerzen. [**Causes of Death and Ill Health in Mink**].—*Dtsch. Pelztierz.* p. 203. [Abst. from abst. in *Berl. Münch. tierärztl. Wschr.* May 9th. 234. (1941)].

The two most important diseases of mink on German fur animal farms are acute enteritis and TB. Other conditions observed are streptococcal infection, injury from foreign bodies in the intestine, gastric distension, and urinary bladder calculi. Parasitism is rare.

WHITE, E. G. (1941). **Chronic Focal Interstitial Hepatitis in the Pig.**—*Vet. J.* **97.** 155–172.

A brief summary is given of the incidence of " white spot liver " in the British Isles and Eire, based on reports by 14 veterinary and lay sanitary meat inspectors on 1½ million pigs slaughtered annually. An average of about 10% of these pigs showed the condition. There is a lengthy review of the literature. Results of macroscopic and histological examination of 26 naturally occurring cases, described in detail, lead to the conclusion that the condition is commonly caused by migrating ascarid larvae on their way to the lungs. Larger and less common lesions found in five livers contained immature forms of *Fasciola hepatica* which had failed to reach the bile ducts. Stricter control of ascarid infestation is suggested in view of the loss entailed by partial or total seizure of affected livers, and of the high incidence of pneumonia frequently attributed to ascarids in young pigs.—R. O. M.

I. ANDERSEN, T. T., & TULINIUS, S. (1938). **The Etiology of Hepatitis Epidemica II. (Epidemic Jaundice).**—

Acta med. Scand. **95.** 497–509. [In English]. [For part I, see *V. B.* **8.** 597].

II. PETERSEN, A. (1939). Om Icterus hos Svinet. Forekommer der en infektiøs-enzootisk Hepatitis hos Svinet, og er den identisk med Menneskets Hepatitis epidemica? **[Icterus in Swine: the Existence of Infectious Hepatitis in Swine and its Relation to Human Epidemic Hepatitis].**—*Maanedsskr. Dyrlaeg.* **51.** 273–296 and 314–324.

III. ANDERSEN, T. T. (1940). Undersøgelser over Aetiologien til Hepatitis Epidemica. **[Aetiology of Epidemic Hepatitis].**—*Medlemsbl. danske Dyrlaegeforen.* **23.** 121–132 and 147–163. [Addendum by PETERSEN, pp. 155–163].

I. In an attempt to elucidate the cause of human epidemic hepatitis and of porcine hepatitis in Denmark [see *V. B.* **8.** 597.], the authors succeeded in transmitting the human disease to pigs by feeding them on duodenal juice from human patients. They also passaged the disease to other pigs by means of liver substance. The naturally occurring porcine hepatitis was established by the same means in normal swine. Positive results in all these experiments were obtained only when the pigs were on a bare maintenance diet. Pigs on better rations did not contract the infection.

Naturally affected pigs and pigs experimentally affected with material of porcine or human origin showed on P.M. examination a pale, yellow, swollen liver so friable that it broke on being lifted. The histological appearance is illustrated. It is characterized by swelling of the cells to as much as four times normal size. In the most severe cases the cell wall network and the nuclei are present, but the protoplasm has vanished. Affected pigs also have a bilirubinaemia.

All attempts at the Copenhagen Serum Institute to isolate a specific causal organism failed. A very few attempts to transmit the porcine or human disease to pigs by intravenous blood injections gave inconclusive or negative results.

II. This is a detailed discussion on porcine and human hepatitis as they occur in Denmark and some Baltic islands. P., the town veterinarian at Ringsted in Sjaelland, Denmark, observed 429 cases of hepatitis in slaughter swine during the period 1930–36, but only 68 of them were uncomplicated by lesions elsewhere in the body. A table is given showing the monthly incidence of the above 68 cases and another showing the incidence of human hepatitis in the same district and also over the whole of Denmark as well as on Bornholm island. The figures suggest a connexion between the two, as hepatitis became more prevalent in both pigs and man during the later years. The greatest incidence of human hepatitis occurred in the north of Jutland and on the islands Bornholm and Gotland (3% of the local populations), but corresponding figures for swine are not available. On the contrary the disease was hardly seen at all in swine in Gotland.

P. quotes extensively from I above and from sundry medical publications, in an attempt to point to the cause of the condition, but all work has so far failed to reveal it. It is evidently not a specific micro-organism.

III. In a lecture to the Danish veterinary society, A. reviews the knowledge on epidemic hepatitis in man in Denmark and reports investigations into statistics on human cases and on the occurrence of icterus as a sign of hepatitis in slaughtered swine, mainly for the four years 1931–34. There was no very significant correspondence between the incidence of hepatitis in the two species. It is suggested that the necessary omission from the abattoir records of all the house slaughterings done in the country may be the weak point in proving such correspondence. Another approach purporting to link up the consumption of pork with epidemic hepatitis gave some positive indication, for the peak of incidence of the disease in 1931–32 corresponded loosely with a rapid fall in the price of pork in 1931–33, which was presumably accompanied by increased consumption.

A. then described in full the experimental work which was outlined in I. PETERSEN added some remarks on the latest results of research. Some of the experimental pigs fed with human or porcine material (as in I) were not killed but kept on an ordinary commercial diet for 9–10 months. They had normal health and weight throughout and on slaughter were found to be affected with slight interstitial hepatitis (large hard liver), but histological examination showed normal liver cells and thickened interstitial tissue. An attempt to set up the disease in g. pigs and fowls failed, but

rats were made ill when fed condemned pig liver and when a few of such rats were killed and eaten by pigs the pigs contracted the typical liver disease.

[P. chooses to regard the described porcine liver disorder as a "hepatitis" and the cause as an unidentified "infection", though it appears from the description, history, and photomicrographic figures that it is a degeneration.]—J. E.

DURANT, A. J., & DOLL, E. R. (1941). **Ulcerative Enteritis in Quail.**—*Res. Bull. Mo agric. Exp. Sta.* No. 325. pp. 27.

Ulcerative enteritis is an infectious and contagious disease of game birds, chiefly quail, young birds up to two weeks old being particularly susceptible, and birds reared artificially in small areas may contract severe infection. Death usually follows a terminal septicaemia. No filter-passing virus could be detected and cell inclusions could not be found in the ulcerative lesions. No single bacterial species or mixture of the many isolated from lesions produced the disease by oral administration, but suspensions of the ulcers given *per os* produced typical ulcers. Contamination of food and water probably accounts for the natural spread of the disease. The histopathology of the lesions, the symptoms produced, and the resistance of the infective agent (thought to be bacterial), together with transmission experiments by contact and dosage in quail, partridges, turkeys, and common fowl are all detailed.—C. V. WATKINS.

NORDLUND, I. (1941). Amyloidos hos Mink. **[Amyloidosis in Mink].**—*Skand. Vet-Tidskr.* **31.** 1–8. [English summary].

N. claims that this is the first description of amyloidosis in the mink and submits details of 22 cases. The disease is fairly common, is found on certain farms only and may be related to the diet. As in the rabbit, lesions are most common in the spleen and liver; microscopic lesions were observed in the lung, adrenals, and mucous membrane of the stomach and bowel. The kidneys were rarely involved. The macroscopic and microscopic characters of the lesions are described. Amyloidis occurs most frequently alone, but may co-exist with other diseases such as pleurisy, lymphadenosis, and abscess formation.

—G. B. BROOK.

DICK, G. F., & LEITER, L. (1941). **Some Factors in the Development, Localization, and Reabsorption of Experimental Amyloidosis in the Rabbit.**—*Amer. J. Path.* **17.** 741–753.

Amyloidosis was produced in rabbits by the intravenous injection of various bacteria. In a number of rabbits examined before amyloidosis had had time to develop, marked lymphoid and reticular cell hyperplasia was noted in the splenic follicles, often with numerous mitotic figures. The relative distribution of amyloid in the main sites of occurrence, *viz*, spleen, liver, kidney, and adrenal, was determined largely by the total length of the experimental period and subsequent survival period. Apparently, bacterial amyloidosis developed first in the spleen, the liver, and later in the kidneys, with subsequent diminution or disappearance of splenic and hepatic amyloid, but an increase in renal amyloid, and probably in adrenal amyloid. In the spleen, the process of reabsorption seemed to be largely the result of invasion of leucocytes, polyblasts, and capillaries from the adjacent pulp; following reabsorption, the follicles remained atrophic, and sometimes fibrotic.

The duration of injections seemed to have little relation to the degree of development of amyloidosis, and the role of chronic infection and suppuration was not clearly significant, as the rabbits not developing amyloid showed such infection to about the same extent as the positive animals. Artificial hyperglobulinaemia, the result of injections of rabbit serum or globulin, did not regularly produce amyloidosis. Gross aortic disease (medial necrosis and calcification, or atheroma) was six times as prevalent in rabbits with amyloidosis as in the non-amyloid series.—E. COTCHIN.

FURTH, J., & BARNES, W. A. (1941). **Differences between Malignant Blood Cells from Induced and Spontaneous Leukemias of Mice.**—*Cancer Res.* **1.** 17–22. [Authors' summary copied *verbatim*].

Leukemic cells from spontaneous and induced leukemias may differ genetically as indicated by transmission experiments. This difference may be explained by assuming that the cells of the induced leukemias are mutants.

ISRAËLS, M. C. G. (1941). **Morbid Red-Cell Development and the Treatment of Anaemia.**—*Lancet.* **241.** 207–209.

A scheme of the normal development of the red blood cell in the bone marrow is suggested and four main groups of pathological changes leading to various types of blood diseases are described. Treatment of an anaemia must vary according to the pathological group to which it belongs.—F. AYLWARD.

ENGEL, S., & GRÜNEBERG, H. (1940). **The Pathology of the Lungs in a Lethal Mutation in the Rat** (*Rattus norvegicus*). —*J. Genet.* **39.** 343–349.

A certain recessive lethal gene in the rat affects the cartilages, notably of the ribs and trachea, their enormous hypertrophy transforming the thorax into a rigid narrow carapace, fixed in a position of extreme inspiration, so that respiration is almost entirely abdominal. The lungs are secondarily affected, being less differentiated than normal, and the ductuli being almost entirely non-alveolated: this diminution of respiratory surface leads to forced respiration, resulting in over-distension of these primitive undifferentiated airspaces—a condition resembling, but not identical with, true emphysema.—E. COTCHIN.

LOOFBOUROW, J. R., DWYER, C. M., & CRONIN, A. G. (1941). **Proliferation-Promoting Intercellular Hormones. 2. Evidence for their Production by Living Cells as a Response to Injury.**—*Biochem. J.* **35.** 603–609. [For part I, see *V. B.* **11.** 906].

Experiments with yeast cells killed and injured by ultra-violet radiation showed (1) that more potent preparations of proliferation-promoting intercellular hormones were obtained from cells injured slowly rather than from those killed rapidly, (2) that there was a rapid increase in these factors in the intercellular fluids before appreciable killing, (3) that greater yields were obtained from cells fragmented or killed by boiling after rather than before prolonged injury, and (4) that CO_2 increased the yield of active factors in the intercellular fluids without killing the cells. These results suggest that living injured cells do produce proliferation-promoting factors (intercellular wound hormones) while undergoing injury and that the factors are released into the intercellular fluids by the injured living cells and are not present as a result of cell disintegration or because these factors are already in the cell and are released as a result of increased membrane permeability.
—R. ALLCROFT.

RUNNELLS, R. A., & BENBROOK, E. A. (1941). **Malignant Melanomas of Horses and Mules.**—*Amer. J. vet. Res.* **2.** 340–344.

Fourteen horses and two mules supplied the 16 tumours for this report. Ten of the horses were grey Percherons, one of the mules was grey, and the other five animals were presumably grey. Age as well as colour was a factor in the incidence; the majority of the animals were known to have been aged 8–18 years. The period of growth of most of the malignant melanomas was a matter of months. The primary tumours in the 16 cases occurred in all parts of the body. In many of the tumours deposition of melanin was considerable; in one of the cases the greatest amount of melanin was associated with the primary tumour and older metastases; in rapidly growing metastases, pigmentation was absent or only slight. Case reports are given of four animals in which extensive metastases occurred. The designation "malignant melanoma" is used in this paper in preference to the more common name melanosarcoma, since the exact origin and nature of the melanoblasts which form these tumours have not yet been determined.
—N. J. SCORGIE.

AJELLO, P. (1939). Osservazioni sul tumore genitale contagioso del cane. [**Contagious Genital Tumours of Dogs**].—*Nuovo Ercol.* **44.** 201–228.

Eighty-four cases of contagious genital tumours in dogs were studied. Three cases in which there were metastatic growths are described in detail, in one case the tumour being located on the left costal region, in the second at the side of the penis involving a lymph node and in the third on an eyelid.

Of the 84 cases, 68 occurred in females; this is explained by the breeding habits of dogs, an infected male being able to transmit the condition to many females. No special age or breed incidence was observed and metastasis and extragenital location of the growths were found to be very rare. Recurrence after surgical removal was found to be very common.

Many histological examinations were carried out without conclusive results as to the true nature of the growth.—MILLER WATSON.

CARTA, A. (1940). Raggi solari e cancro dei gatti bianchi. [**Solar Rays and Skin Cancer in White Cats**].—*Clin. vet., Milano.* **63.** 85–97.

C. reports a case of squamous epithelioma

located on the external ear of a white cat, and a case of basal cell cancer of the same region in another white cat. Both animals were, for different reasons, much exposed to sunlight and C. considers that excessive exposure to ultraviolet rays played an important part in the aetiology of the conditions.—MILLER WATSON.

WARREN, S., & GATES, O. (1941). **Spontaneous and Induced Tumours of the Guinea Pig.**—*Cancer Res.* **1.** 65–68. [Authors' summary copied *verbatim*].

1. Cases of development of tumors, both spontaneous and induced, in guinea pigs have been collected.

2. One spontaneous and 4 induced tumors are reported.

3. The guinea pig appears to be resistant to the development of spontaneous tumors; to transplantation, at least in heterozygous animals, of tumors spontaneous and induced; and to the production of induced tumors other than of the gall bladder.

4. Carcinogenic hydrocarbons are much less potent in guinea pigs than in mice.

CHEAVER, F. S., & JANEWAY, C. A. (1941). **Immunity Induced against the Brown-Pearce Carcinoma.**—*Cancer Res.* **1.** 23–27. [Authors' summary copied *verbatim*].

1. In confirmation of Besredka's reports, it was observed that over 90 per cent. of intradermal Brown-Pearce carcinomas regressed spontaneously, and that rabbits, with intracutaneous tumors, or in which these tumors had regressed, were refractory to subsequent implantations of the tumor.

2. Pathological and immunological studies shed no light on the fundamental nature of this immunity. The possibility of its being non-specific tissue reaction is discussed.

GREENE, H. S. N. (1939–41). **Uterine Adenomata in the Rabbit. II. Homologous Transplantation Experiments. III. Susceptibility as a Function of Constitutional Factors.**—*J. exp. Med.* **69.** 447–466, and **73.** 273–292.

[Author's summaries copied *verbatim*].

II. The behaviour of a transplanted adenocarcinoma of the uterus of a rabbit has been studied through 12 serial generations in the anterior chamber of the eye and 6 serial generations in the testicle. The transplanted tumor is characterized by slow growth which is at first expansive and later invasive, by an ability to form more or less differentiated structures in response to different environmental conditions and by late metastasis. The endocrinological changes that distinguish animals bearing the spontaneous tumor do not occur in animals bearing the transplanted tumor.

Various experiments were undertaken in an attempt to discover the nature of the factors determining the characteristics of the spontaneous and of the transplanted tumor. It was found that successful transplantation was followed by a phase during which animals were refractory to reinoculation. The results of transplantation into the eyes of animals with spontaneous tumors suggested the existence of a similar phase during the early development of the tumor but the number of observations was not sufficiently numerous to warrant definite conclusions.

III. An investigation of uterine adenomata in the rabbit revealed an incidence of 16·7 per cent in the total female population over 2 years of age. However, the incidence varied widely in relation to age, breed, and genetic constitution and closely paralleled that of toxaemia of pregnancy with reference to the same constitutional factors. In addition, all of the tumor bearing animals suffered attacks of this disease during their earlier breeding history. The facts suggest that the association of the two disorders occurred as a result of the liver damage incident to toxaemia which impaired the function of this organ in relation to estrin inactivation and the concentration of this substance in the blood stream subsequently rose to a carcinogenic level.

A consideration of the disparity in the distribution of uterine growths in rabbits and women indicated that the absence of squamous epithelium in the cervix of the rabbit and the greater physiological activity of the endometrium of the fundus in this species were the determining factors.

MACKENZIE, I., & ROUS, P. (1941). **The Experimental Disclosure of Latent Neoplastic Changes in Tarred Skin.**—*J. exp. Med.* **73.** 391–416. [Authors' summary copied *verbatim*].

A carcinogenic tar applied to rabbit skin renders many more epidermal cells neoplastic than ever declare themselves by forming tumors. They may be present in large numbers and persist for a considerable time after brief

tarring, yet give rise to no growths unless encouraged. The stimulus of wound healing will suffice to make some of them multiply and form tumors.

No evidence has been obtained, in experiments specifically directed to the point, that the cells which tar renders neoplastic respond in this way because they are possessed of peculiarities not shared by the rest of the normal epithelium.

The fact that non-specific stimulation (as *e.g.* wound healing) may act as the deciding influence in tumor formation brings out the need for a sharp distinction between the forces which induce neoplastic change and those which determine, or prevent, its realization in terms of a tumor. The distinction is vital to the appraisal of the many carcinogenic substances worked with nowadays.

The ability of tumor cells to lie latent for long periods, and respond to non-carcinogenic stimulation by multiplying into growths provides an explanation of those clinical instances in which cancer appears rapidly after acute injury to tissue that had seemed normal.

LEWISOHN, R., LEUCHTENBERGER, C., LEUCHTENBERGER, R., LASZLO, D., & BLOCH, K. (1941). **Prevention of Tumor Growth (Carcinoma 21C3) by Intravenous Injections of Yeast and Vitamins.** *Science.* **94.** 70–71.

The effects were observed on the growth of a resistant mammary adenocarcinoma in mice of intravenous injections of yeast extract, of three vitamins (pantothenic acid, riboflavin, and thiamin), and of combinations of yeast extract with the vitamins. Yeast extract alone and the vitamins alone had little effect; but the combination of yeast extract and pantothenic acid prevented tumour growth in 47% of the mice and that of yeast extract and riboflavin in 62%. Thiamin and yeast extract had no preventive action.—J. P. GARDNER.

PARSONS, L. D., & WARREN, F. L. (1941). **Cellular Changes in the Spleen and Lymph Glands in Mice Used for Carcinogenic and Related Experiments, with Special Reference to the Giant Cells of the Spleen.**—*J. Path. Bact.* **52.** 305–321. [See also *V. B.* **9.** 728].

Nine groups of mice, one of which was normal, were examined. Of these groups, two, namely those bearing subcutaneously grafted generations of either the 1 : 2-benzanthracene sarcoma or the Mal. sarcoma, showed 2–3 times the normal number of giant cells per unit area of spleen, whereas four groups bearing primary sarcomas or receiving injections of a carcinogenic compound subcutaneously showed about half the normal number. In another group bearing intraperitoneal grafts of the Mal. sarcoma, the number of giant cells was about one-sixth of the number in the group bearing subcutaneous grafts of the same tumour. Much the greatest diminution of giant cells was seen in the group of mice subject to X-radiation.

There was a significant degree of correlation between the blood leucocyte counts and the splenic giant cells per unit area in each group. Extramedullary myelopoiesis is described in the group of mice bearing subcutaneous grafts of the Mal. sarcoma, histological examination of the spleens showing myeloid metaplasia with large numbers of giant cells, myeloblasts, and immature cells of the granular series.

Excess and defect respectively of giant cells were correlated with the absence or presence of iron-reacting deposits in the lymph nodes: these deposits were absent in young normal mice and in mice bearing subcutaneous grafts of sarcoma, but were present in mice bearing primary sarcomas or intraperitoneal grafts and in mice under treatment with the Mal. compound or X-rays.

The size of the spleen was increased in mice bearing subcutaneous grafts of sarcoma and decreased in mice treated with X-rays or bearing intraperitoneal grafts.

The results obtained are discussed in detail in relation to the resistance of the mice to tumour formation.

[The sarcoma obtained by BURROWS in 1933 was called the Mal. sarcoma owing to the fact that maleic anhydride was used in the preparation of the compound injected.]—E. COTCHIN.

NUTRITIONAL AND METABOLIC DISORDERS

SAMPSON, J., & BOLEY, L. E. (1941). **The Physiological Basis of Therapy for Ketosis in the Ruminant.**—*Amer. J. vet. Res.* **2.** 327–332.

The authors believe that ketosis in cattle is the result of a disturbance of the carbohydrate-fat metabolism due to an insufficient supply of easily digestible carbohydrate in the diet. An

account of eight clinical cases in dairy cattle is given; glucose therapy was adopted in each case. This proved most effective when given early by subcutaneous or intravenous injection supplemented by glucose or molasses by mouth.—A. T. PHILLIPSON.

JACOB, S. (1940). **Night-Blindness or Hemeralopia.**—*Indian vet. J.* **17.** 157–160.

J. describes the aetiology, symptoms, and treatment of idiopathic cases of night blindness in Indian cattle and compares them with those of some human cases observed by other workers. The cattle were underfed, exposed for long periods to the glare of strong sunlight, infected by trypanosomes, or fed on overboiled gram [*Cicer arietinum*] possibly containing little carotene.—R. MUKHERJEE.

EARLE, D. P., Jr., & VICTOR, J. (1941). **Cirrhosis of the Liver Caused by Excess Dietary Cystine.**—*J. exp. Med.* **73.** 161–172.

Cystine, at levels of 5% and 10% respectively, was substituted for equivalent quantities of sucrose in the basal diet of two groups of young male albino rats. The animals in the 10% group showed poor appetite, and in many cases became lethargic and moribund within 3–4 days with localized lesions of haemorrhagic necrosis in the portal area; those which survived the acute lesion developed fatty infiltration and subsequent cirrhosis of the liver, but there were no renal lesions. The animals in the 5% group survived the initial period of weight loss and except in one case, which developed haemorrhagic renal lesions, grew slowly but steadily; in animals selected for autopsy there was marked fatty infiltration of the liver, and in some cases the haemorrhagic portal lesions followed.

The portal haemorrgahic necrosis is stated to be strikingly similar to the lesion encountered in eclampsia and to the lesions which have been produced experimentally by clamping of the renal arteries and by feeding with selenium. No traces of Se were detected in the cystine preparation which was employed.—A. N. W.

KIELIGER, F. (1938). Röntgenologische und histologische Knochenuntersuchungen bei zwei Rindern mit Störungen des Ca- und P-Stoffwechsels. [**X-Ray and Histological Bone Examination of Two Bovines with Ca and P Metabolic Disorder**].—*Inaug. Diss., Zurich.* pp. 20.

Two heifers, ten months and two years old, were diagnosed as rachitic and observed over a period of nearly four years before slaughter. Slight hypocalcaemia and marked hyperphosphataemia were shown initially. Gradual recovery ensued, but disturbance of ovarian functions persisted although other endocrine functions appeared normal. Even after four years there was evidence of somewhat excessive deposition of osteoid in secondary spongiosa. Twenty-eight X-ray photographs are given, but do not reveal much.—H. H. GREEN.

WAY, C. (1941). **The Importance of Vitamin-Mineral Supplements in Equine Nutrition.**—*J. Amer. vet. med. Ass.* **99.** 121–129.

Attention is drawn to the special nutritive requirements of young racehorses, due to the early age at which they start work, and it is suggested that mere maintenance levels of the various vitamins and minerals may be quite inadequate for young bloodstock. There is no new information concerning the requirements for, and deficiencies associated with, the individual substances, and it is suggested that deficiencies which occur are usually multiple in nature and should be treated accordingly.

—ALASTAIR N. WORDEN.

LECOQ, R. (1941). Le rôle de l'alcalose dans la production du rachitisme expérimental. [**The Role of Alkalinity in the Experimental Production of Rickets**].—*C. R. Acad. Sci., Paris.* **212.** 938–940.

Young rats were maintained on Randoin & Lecoq's basal rachitogenic diet for seven days, when rachitic lesions were apparent. 15% lactic acid was then added to the diet of one group of rats, and within ten days the lesions showed complete calcification, whereas in the control rats, receiving the basal diet only, the lesions were increased. Analyses made immediately after decapitation of the animals showed a slight decrease in orthophosphates and an increase in lactic acid and total acid-soluble phosphorus of the muscles, as well as a lowering of alkali reserve in the plasma, of rats receiving lactic acid as compared with the controls.

It is concluded that, whatever may be the mechanism involved in its production, experimental rickets may be regarded as a manifestation of alkalinity, a condition which may be easily corrected without any alteration in the vitamin D content or Ca : P ratio of the diet.

JAVILLIER, M., & ÉMERIQUE-BLUM, L. (1941). Le rachitisme expérimental en présence d'un excès de vitamine A. [**Development of Experimental Rickets in the Presence of Excess Vitamin A**].—*C. R. Acad. Sci., Paris.* **212.** 289–292.

No difference in the time of onset of rickets was observed between rats maintained on Steenbock and Black's basal rachitogenic diet and those fed the basal diet with a supplement of 30 μg. or 300 μg. of vitamin A.

In a further experiment the basal diet was modified so that it contained more protein, and the Ca : P ratio was maintained at 6 : 7 instead of 7 : 8. Four groups of rats were fed this diet; group (1) also received calciferol, groups (2) and (3) received 60 μg. and 300 μg. respectively of carotene, and group (4) was given no supplements. At the tenth day, no traces of rickets had developed in rats of group (4), whereas those of groups (2) and (3) presented distinct lesions. At the 22nd day groups (2) and (3) were severely affected, while by the 35th day rats of group (4) had developed the condition to the same degree as had groups (2) and (3) at the tenth day.

It is concluded that excess vitamin A hastens the onset of symptoms of vitamin D deficiency.

DAVID, J. D., & YAKUB SHAH, K. M. (1941). **Successful Treatment of a Newly Born Heifer Calf with Shark Liver Oil for Vitamin Deficiency.**—*Indian vet. J.* **18.** 107.

A newly born heifer calf, unable to extend the fore feet, was cured within a month by administration of shark liver oil internally and as a liniment to the affected part. More prolonged use of the oil also greatly improved the animal's general condition. The beneficial results are ascribed to the high vitamin A content of the oil.—S. N. RAY.

LANGHAM, R. F., SHOLL, L. B., & HALLMAN, E. T. (1941). **The Pathology of the Bovine Kidney in Vitamin A Deficiency.**—*Amer. J. vet. Res.* **2.** 319–323.

A histological examination was made of the kidneys of 23 adult cattle and calves in which acute or chronic vitamin A deficiency had been induced. The most severe lesions occurred in the kidneys of a group of half-grown and adult animals which had been made moribund by an unrelieved deficiency lasting for six weeks to 18 months, and similar but less severe lesions were encountered in all other cases.

The changes were mainly degenerative in character, and in many cases there was cloudy swelling which commenced in the proximal convoluted tubules. Varying degrees of necrosis were observed in the tubular epithelium, and in some cases there was pycnosis in the glomerular epithelium or in the arteries and arterioles. In some specimens there were inflammatory changes which appeared to have begun as perivascular accumulations of lymphocytes and macrophages and to have spread to the interstitial tissues. Fibrosis was evident in some lesions. Metaplasia of transitional epithelium was observed in the minor calyces of several kidneys, but in one case only (in a ureter) was epithelial keratinization seen.

These and other changes are illustrated by a series of 21 photomicrographs. The gross changes were somewhat variable.—A. N. W.

BRAUDE, R., FOOT, A. S., HENRY, K. M., KON, S. K., THOMPSON, S. Y., & MEAD, T. H. (1941). **Vitamin A Studies with Rats and Pigs.**—*Biochem. J.* **35.** 693–707.

Carefully purified specimens of vitamin A (alcohol), a natural vitamin A ester concentrate, β-carotene, and zeaxanthin were each fed in both high and low dosage to small groups of weanling pigs which were provided with a basal diet devoid of vitamin A. Assays of the same substances were made by curative tests in rats.

Zeaxanthin was found to be inactive as a source of vitamin A in both species, and it is suggested that the positive results claimed for this substance by other authors must have been due to contamination of the material employed. Vitamin A and its ester appeared to be equally efficacious for both species, and while β-carotene also was effective in both instances, it was much less so in pigs. From the somewhat limited number of experiments, it was calculated that the minimal daily requirement of the pig for vitamin A and β-carotene was about 100 I.U. and 300 I.U. respectively per 10 lb. body weight.

The suggestion of other workers that separate standards be created for carotene and vitamin A is commended.—ALASTAIR N. WORDEN.

LAWRIE, N. R., MOORE, T., & RAJAGOPAL, K. R. (1941). **The Excretion of Vitamin A in Urine.**—*Biochem. J.* **35.** 825–836.

When the antimony chloride test was used, no trace of vitamin A was detected in urines of normal human subjects, but a positive test was obtained in urines of pathological subjects.

Excretion of vitamin A was most frequent and in highest concentration in pneumonia and in chronic nephritis, and in these diseases very low reserves of vitamin A have been found in the liver at autopsy, although the amount lost in the urine cannot account fully for the diminution of the liver reserves. Large amounts of the vitamin were found in the urine of normal dogs. It was not excreted in more than traces by rabbits, and was absent from the urine of normal and diseased rats. It was concluded that vitamin A, as it occurs in pathological human urine, is associated with a non-heat-coagulable protein fraction.—J. P. G.

CARLSTRÖM, B., LÖVGREN, O., & SJÖBERG, K. (1941). Pyrofosfattillskottets betydelse vid aneurinbehandling. **[The Importance of Pyrophosphate in Aneurin Therapy].**—*Skand. VetTidskr.* **31.** 150–158. [English summary].

In view of criticism made at a medical congress of aneurin-pyrophosphate therapy [see CARLSTRÖM *et al.*—*V. B.* **11.** 470.] and of the composition of "phospho-B-vimin", a commercial preparation claimed to contain both substances, the authors analysed chemically seven samples of it as well as samples of other similar preparations. They found that all the samples of "phospho-B-vimin" were up to standard in aneurin and pyrophosphate content, but that some of the others were not, either in their original composition or on account of oxidation of the pyrophosphate. A few human case records of successful aneurin pyrophosphate therapy are given as fresh evidence of its value.—J. E.

CARLSTRÖM, B., LÖVGREN, O., & SJÖGREN, B. (1941). Den terapeutiska effekten av muskeladenylsyra och adenosintrifosforsyra vid s.k. reumatiska sjukdomstillstånd. **[The Therapeutic Effect of Muscle Adenylic Acid and Adenosinetriphosphoric Acid in Rheumatic Morbid Conditions].**—*Skand. VetTidskr.* **31.** 159–162. [English summary copied *verbatim*].

In connection with their observations concerning the importance of additional pyrophosphate for the effectivity of aneurin (thiamin), the authors have made therapeutic experiments with muscle adenylic acid and adenosinetriphosphoric acid. The biological importance of these substances is, mainly, that they are active in the enzymatic phosphorylation. These experiments have shown that some neuritic, neuralgic and myalgic affections, as well as chronic polyarthritis in man, which are resistant to treatment with aneurin or aneurin with pyrophosphate, are very frequently favourably affected by the addition of small quantities of muscle adenylic acid and adenosinetriphosphoric acid.

STREET, H. R., COWGILL, G. R., & ZIMMERMAN, H. M. (1941). **Further Observations of Riboflavin Deficiency in the Dog.** *J. Nutrit.* **22.** 7–24. [See also *V. B.* **12.** 49].

The authors describe the symptoms and lesions exhibited by five dogs with acute, and four with chronic, riboflavin deficiency. The chronic deficiency was induced by allowing suboptimal daily doses of 4–8 μg. of riboflavin per kg. body weight, whereas control animals, which were paired-fed so as to receive the same food intake as the deficient dogs, received 25 μg. riboflavin per kg.

Loss of weight and deposition of visible fat in the liver occurred in the control as well as in the deficient animals, and it is suggested that the "yellow livers" noted by SEBRELL & ONSTOTT [*V. B.* **8.** 800.] may have been due to inanition. Corneal opacities occurred in both the acute and chronic deficiency groups, and in the latter there was a progressive loss of muscular control of the legs, and finally the deep limb reflexes were lost also. Histological examination showed that in these animals there was a myelin degeneration of peripheral nerves and of the dorsal columns of the spinal cord. The haemoglobin values, red blood corpuscles counts, and analyses of the gastric contents of the chronically deficient animals remained within normal limits. Some dogs exhibited a persistent scaling of the skin, accompanied by erythema.—A. N. WORDEN.

ASPLIN, F. D. (1941). **Riboflavin Deficiency in Poultry.**—*Vet. J.* **97.** 16–26.

A brief account of riboflavin deficiency of fowls is given, and a description is provided of the condition as it occurred in 32 chickens and in a flock of inbred White Leghorn pullets in which hatchability was low; in both instances the symptomatology was typical of that recorded by American writers. Several of the chicks were cured by the daily administration of 50 μg. of riboflavin, while in both instances

the addition of yeast to the mash prevented further losses.—ALASTAIR N. WORDEN.

BOK, T. K. (1939). Over tropische spruw en experimenteele B_2-deficienties bij honden en apen. **[Tropical Sprue and Experimental Deficiency of the Vitamin B_2 Complex in Dogs and Monkeys].**—*Thesis, Amsterdam.* pp. 164. [English summary].

Extensive data are presented from 35 patients suffering from tropical sprue and two cases of steatorrhea regarded as incipient sprue. Special attention was paid to adequacy of diet, occurrence of preceding amoebic or bacterial dysentery, duration and place of residence in the Dutch Indies before onset of disease, familial incidence, results of treatment, and possibility of cure. The primary cause of sprue is still obscure but a dietary régime low in fat and carbohydrates but high in proteins and vitamins, including liver, was nearly always followed by cure.

Experimental blacktongue was produced in five out of seven dogs on a diet deficient in the B_2 vitamins, preventable by dried yeast or nicotinic acid. In two black dogs the hair became grey. With the same diet a macrocytic hyperchromic anaemia, with hyperplastic megaloblastic bone marrow, was produced in a monkey (*Macacus rhesus*). Blacktongue and human pellagra are regarded as clearly allied diseases; although blacktongue makes the pathogenesis of several sprue-like symptoms understandable, it does not elucidate the aetiology of sprue.—H. H. GREEN.

GYÖRGY, P., & ROSE, C. S. (1941). **Cure of Egg-White Injury in Rats by the "Toxic" Fraction (Avidin) of Egg White Given Parenterally.**—*Science.* **94.** 261–262.

A certain fraction of egg-white, termed "avidin", had previously been found to produce all the symptoms of "egg-white injury" [see *V. B.* **12.** 114.] when given in small doses by mouth. When similar doses of the same fraction were administered parenterally, however, they were found not only to be non-toxic but also to prevent or cure the symptoms set up by feeding an injury-producing egg white diet. It is suggested in explanation that the avidin fractions contained biotin in a bound form, and that whereas this remained as such in the intestine it appears to have been released on parenteral injection [see also *V. B.* **11.** 553].
—ALASTAIR N. WORDEN.

GYÖRGY, P., & GOLDBLATT, H. (1940). **Choline as a Member of the Vitamin B_2 Complex.**—*J. exp. Med.* **72.** 1–10.

Fatty changes occurred in the livers of young rats which were provided with a basal vitamin B deficient diet supplemented by vitamin B_1 and riboflavin: when daily doses of 10–100 μg. of vitamin B_6 were added, there was an increased early mortality rate and about 15% of the animals developed necrosis of the renal cortex. The addition of cystine led also to the production of renal lesions. These lesions, the histology of which is described in full, were prevented by daily doses of 2 mg. of choline [see also GRIFFITH *et al.*—*V. B.* **12.** 231–232].

It is asserted that most basal diets which are employed in studies of the vitamin B_2 complex are deficient in choline, which may itself be regarded as a potential member of the complex.
—ALASTAIR N. WORDEN.

GRIFFITH, W. H. (1941). **The Nutritional Importance of Choline.**—*J. Nutrit.* **22.** 239–253.

A review dealing with the dietary indispensability and metabolic functions of choline. The lipotropic action of choline and its function as a methylating agent have already been discussed [see *V. B.* **12.** 231–232]. Choline appears to combat perosis in chickens and to be essential for egg production, while it depresses the polycythaemia induced in dogs by large doses of cobalt.—A. N. WORDEN.

RAY, S. N. (1941). **Concentration of Vitamin C (Ascorbic Acid) in the Tissues of Farm Animals in Health and Disease.**—*Indian J. vet. Sci.* **11.** 78–83.

The concentration of vitamin C was found to decrease in the blood, liver, and spleen of certain animals (cattle, goats, ponies, and fowls) affected with rinderpest, blackleg, and helminthiasis, but in acute theileriasis and Newcastle disease little or no such reduction was seen. In rinderpest the diminution of vitamin C in the blood ran almost parallel with the severity of the infection.

A sharp initial rise in the concentration of vitamin C in the blood was observed within 24 hours of inoculating rinderpest virus, while only a smaller rise was noticed after the 18th. day of infection with theileriasis.—N. B. DAS.

PHYSIOLOGY

*Derzsy, D. (1941). **[An Examination of the Eyes of Sheep].**—*Közl. Oesszehas. élet-es kórtan Köreből.* **29.** 288. [Abst. from abst. in *Dtsch. tierärztl. Wschr.* **49.** 429].

Anatomical notes based on the examination of the eyes of 539 sheep. Common minor injuries observed are also noted. Myopia was diagnosed in 89%.

*vom Bowert, H. (1939). Ein Beitrag zur Frage der Alterserscheinungen am Pferdeauge. **[Changes Due to Age in the Eye of the Horse].**—*Inaug. Diss., Hanover.* [Abst. from abst. in *Berl. Münch. tierärztl. Wschr.* May 23rd. 258. (1941)].

The eyes of 50 army horses were examined clinically and those of 100 dead horses by dissection. Age changes noticed included shrinkage of the anterior chamber accompanied by degenerative hardening of the iris, senile cataract which was present in 28% of the clinical cases and in 20% of the dead horses, and pigmentary degeneration of the choroid. Opacity appeared on the posterior surface of the lens capsule at 12–14 years of age, later extending into the lens itself. This type of cataract was observed in 15% of the horses. Choroid degeneration was present in 16% of the army horses and in 25% of the others. With increasing age it sometimes spread to the retina, causing retinitis pigmentosa. All these age changes caused only slight visual disorders during the normal working life of the horses.

Trautman, A., & Asher, T. (1940). Röntgenologische Untersuchungen zur Motorik des Colons des Schweines. **[X-Ray Observations on the Motor Function of the Colon of the Pig].**—*Arch. wiss. prakt. Tierheilk.* **76.** 119–132.

As a result of these experiments, the authors found a definite series of movements in the colon of the pig which can be associated with its peculiar anatomical arrangement. In the spiral portion there were firstly, oscillating, bending and tonic contracting movements of the individual portions of the centripetal and centrifugal coils; secondly, weak and strong peristaltic waves in the colon generally. In the terminal portion of the colon peristaltic movements only were noticed. In no portion of the colon were anti-peristaltic movements observed.

These observations were made by X-ray examination. A cannula was inserted in the caecum from the left side of the flank and X-ray opaque material poured in. In order to get a clear picture of movements, some tests were made by inserting a rubber balloon filled with the contrast material. The animal was secured in a specially constructed crate.

—C. W. Ottaway.

Dougherty, R. W. (1941). **Further Investigations of Rumen Gases and Bloat in Ruminants.**—*J. Amer. vet. med. Ass.* **99.** 110–114. [See also *V. B.* **11.** 389].

The quantities of carbon monoxide and hydrogen sulphide present in the gases of the rumen were estimated in normal cows and in a cow with a rumen fistula; the former gas varied from 0·0–0·17% by volume and as much as 0·03% by volume of the latter was observed. Larger quantities of H_2S were present in the rumen ingesta and figures up to 0·309 ml. per 100 ml. ingesta were found. The amount of H_2S increased when the diet consisted of alfalfa hay, freshly cut clover, or green alfalfa.

Cessation of rumen movements, prostration, and even death were produced by introducing either of these gases into the rumen. The quantity needed for symptoms to develop varied but the maximum effect was produced by the quick introduction of the gas followed by air, so that the pressure in the rumen was significantly increased. Insufflation with air alone was ineffective even though high pressures were produced.

The addition of cystine, inorganic sulphur, and methionine to rumen ingesta either *in vivo* or *in vitro* produced an increase in H_2S. In a heifer which died from naturally occurring bloat, comparatively large quantities of this gas were present in the rumen ingesta.—A. T. P.

Florey, H. W., Wright, R. D., & Jennings, M. A. (1941). **The Secretions of the Intestine.**—*Physiol. Rev.* **21.** 36–69. [Abst. in *Nutr. Abstr. Rev.* **11.** 65, copied *verbatim.* Signed: R. C. Garry].

This is a review of the external secretions of the small and large intestines of mammals. Three regions are considered: the Brunner's glands region of the duodenum; the rest of the duodenum, the jejunum and the ileum; and

the large intestine. In each region the histology of the gut, and the character, chemical composition and enzyme content of the juices are described. Control of the secretions, nervous, humoral and mechanical, is then dealt with and, finally, the functions of the secretions.

In the Brunner's glands region the juice is alkaline, rich in mucus, and contains amylase and enterokinase. Other enzymes have been described, but the authors are inclined to regard them as endocellular ferments from desquamated epithelial cells. Flow of juice is evoked by a hormone, possibly secretin, and by vagal stimulation. The chief functions of this secretion seem to be activation of pancreatic trypsinogen by means of enterokinase, and protection of the duodenal mucosa by neutralisation of the acid gastric chyme with alkaline mucus.

For the rest of the small intestine the authors put forward the heterodox view that the only true extracellular enzymes of the succus entericus are enterokinase and amylase. All others are derived from cell debris. Knowledge of the control of secretion in this region is defective. There is no unequivocal evidence for either nervous or humoral control.

Colonic juice is rich in mucus and is alkaline. Mechanical irritation of the mucosa and stimulation of the pelvic nerves produce obvious secretion. Derangement of this nervous control may be responsible for the clinical condition of mucous colitis. The authors refuse to commit themselves on the supposed excretory function of the colon. Probably colonic secretions lubricate faecal masses and neutralise acids produced by bacteria.

WEBSTER, W. M. (1939). **Review of the Past Season's Work upon the Problem of Infertility in Romney Rams.**—*Proc. ann. Meet. Sheep Fmrs, N.Z., 1939.* pp. 85–94.

As W. had previously established a correlation between the pH of the semen of rams and its fertilizing power, a number of simple pH testing outfits were issued to sheep breeders to enable them to test the fertility of their rams.

It had been found that alkaline semen was always infertile and that the more acid a sample of semen was, the better were the results obtained from its use for inseminating ewes.

After collection, the semen must be covered immediately with a layer of liquid paraffin and kept in a warmed box for half an hour before testing. The pH is simply estimated by placing a drop of the semen on a white tile and diluting it with an indicator solution which gives a definite colour at different pH.

Results of grazing experiments showed that rams are much more susceptible to environmental changes than is generally supposed and that acclimatization to a change of pasture is more important for fertility than the actual richness of the herbage. There was also evidence, confirmed by artificial insemination experiments, that sudden weather changes have a marked influence on health, sexual appetite, and fertility of rams. Preliminary results of nitrogen utilization of rams on high quality pastures are given, as research with small laboratory animals indicated that excess protein in the diet can lead to male sterility.—R. A.

DANN, L., GLÜCKSMANN, A., & TANSLEY, K. (1941). **The Healing of Untreated Experimental Wounds.**—*Brit. J. exp. Path.* **22.** 1–9.

A technique for the production of standard wounds on rats is described. Three types of wounds were made:—(1) superficial wounds, (2) deep wounds, and (3) third degree burns. The histological changes which occur in such wounds during healing are described and measurements of the rate of epithelial and connective tissue regeneration are given. The rate of epithelization may give no real clue to the healing of wounds and how this is affected by various substances. Epithelial regeneration begins almost at once, but there is a five-day lag in the repair of connective tissue.—J. M. R.

HUGHES, A. F. W., & DANN, L. (1941). **Vascular Regeneration in Experimental Wounds and Burns.**—*Brit. J. exp. Path.* **22.** 9–14.

The technique is described for the preparation of cleared sections of experimental wounds injected with Indian ink. The method consists of forcing a mixture of ink, gelatin, and water into the veins of deeply anaesthetized animals (rats) which carried the wounds, by injection into the left ventricle, the right auricle being slit; 30–40 ml. of the mixture were usually sufficient for a rat 9–18 months old. The abdominal wall was then opened and the whole animal immersed in 5% formol for 24 hours, after which the wound was excised. The excised tissue was washed in distilled water,

dehydrated gradually in alcohol, and transferred to benzene and finally to oil of wintergreen. The cleared tissue was examined with a binocular dissecting microscope, and stereoscopic photographs were made of the preparations which were then sectioned for histological examination. This method enables the photographs to be studied in relation to the histological sections. The chief features seen in such preparations of wounds caused by burns of various degrees and of surgical wounds are described. This method is inapplicable, of course, to biopsy material, but it is suggested that it may provide a useful adjunct to histological methods in assessing the effect of different substances on wound healing.—R. A.

I. WAUGH, W. G. (1941). **Systemic Factors Influencing Wound Healing.**—*Brit. med. J.* Aug. 16th. 236–238.

II. MILES, A. A. (1941). **Some Problems of Wound Infection.**—*Lancet.* **241.** 507–510.

I. The importance of vitamins C and K and of a high protein and balanced fluid intake are discussed in relation to wound healing in human cases. Deficiency of vitamin C results in a fibroblastic aplasia resulting in weak irregular scars; in vitamin K deficiency, production of prothrombin is inhibited, capillary clotting retarded, and the rhythm of vascular regeneration interrupted. Maintenance of a high protein diet and a balanced fluid intake are essential to arrest wasting, to accelerate repair and to prevent oedema, and to maintain a normal blood pressure.

II. A comparison is made between the early and late infection of wounds; the various sources of the later invading organisms are discussed and the importance of aseptic technique in the prevention of infection is stressed. Methods of treatment with various antitoxins and antibacterial chemotherapeutic agents, both natural and synthetic, are dealt with, and the relative values of some of the sulphonamide drugs are considered together with the use of antitoxin as an addition or alternative to the sulphonamides.—R. A.

POISONS AND POISONING

*WILLENBÜCHER, H. (1940). Die Permeabilität der Haut für Nikotin. [**Permeability of the Skin to Nicotine**].—*Inaug. Diss., Hanover.* [Abst. from abst. in *Dtsch. tierärztl. Wschr.* **49.** 100].

Experiments on dogs showed that nicotine applied by a special air-tight glass container to the skin is absorbed to the extent of 7·5% in one hour. When the natural skin wax was removed first, the absorption was 9% and when the skin was cut first it was 16%. A warning is given that nicotine should not be used too freely as a skin parasiticide.

FORBES, J. C., LEACH, B. E., & OUTHOUSE, E. L. (1941). **Studies on Fat Metabolism and Susceptibility to Carbon Tetrachloride.**—*J. Pharmacol.* **72.** 202–210.

It has been shown that subcutaneous injections of xanthine and other relatively insoluble materials render rats more resistant to the poisonous action of carbon tetrachloride and chloroform. It was thought that if the mechanisms of the protective action were understood it might lead to advances in the prevention and treatment of certain liver conditions. The results of the present investigation show that the concentration of neutral fat and cholesterol in the liver is not an important factor in the protective mechanism against CCl_4 poisoning, but that a state of active fat metabolism such as that resulting from feeding fat several hours before CCl_4 administration and from starvation, increases the animal's susceptibility. Animals with fatty livers starved for 24 hours were scarcely more susceptible than normal rats starved for the same period of time. Xanthine administration did not affect the concentration of serum lipids of fasting rats or the blood lipid concentration after oral administration of butter fat, nor did the injection of xanthine have any demonstrable effect on the degree of ketonaemia resulting from starvation. It is also shown that the protective action of xanthine against liver damage by CCl_4 is not directly related to the decrease in serum esterase which follows its subcutaneous administration to normal rats.

—R. ALLCROFT.

HATCHER, W. L. (1941). **Phenothiazine Poisoning in Horses.**—*N. Amer. Vet.* **22.** 159–160.

H. reports the death of five out of 12 race horses after treatment with phenothiazine. These horses were given a prepared mixture of oats, bran, phenothiazine, and molasses which

if evenly mixed would have contained 10% of the drug. Each animal was allowed 2½ lb. of the mixture, *i.e.* about 4 oz. phenothiazine; six of the horses were fed together in a trough and the remainder fed separately in stalls. Deaths occurred on the 2nd, 3rd, 4th, and 6th days after treatment, the affected animals showing signs of violent pain, deep purple-coloured blood and mucous membranes, and a fast and weak heart beat. Autopsies were not performed on all animals, but in one the greatest macroscopic changes were in the kidneys and spleen which were greatly enlarged.

Treatment with methylene blue, calcium gluconate and purgatives was attempted without success.—K. M. Sanderson.

I. Schmidt, H., Christian, T. T., & Smotherman, W. M. (1941). **Is Phenothiazine Poisonous to Horses?**—*J. Amer. vet. med. Ass.* **99.** 225–228.

II. Wolfe, W. R., & Dennis, W. R. (1941). **Toxemia Resulting from the Use of Phenothiazine.**—*Vet. Bull. U.S. Army.* **35.** 171–174.

I. A record of two instances in which deaths occurred in horses following treatment.

In the first instance seven animals were treated (six mares and a colt) and two of the mares died, one five and the other nine days after treatment. The doses given were 60 g. for mares and 30 g. for the colt. A P.M. examination of one mare showed icterus, enlargement of the spleen, and impaction of the colon.

In the second instance five animals were treated (one mare and four colts) and the mare and three of the colts died within three days after treatment. The doses were 100 g. to the mare and 300 g. to the group of colts. P.M. examination of one colt showed a large coagulated mass in the bladder, a smaller similar mass in the hilus of one kidney, and several still smaller similar masses in the ureters.

II. This gives details of illness ending in death of a six-year-old thoroughbred gelding, following a dose of 65 g. of phenothiazine.

—W. J. Ironside.

Hubble, D. (1941). **Toxicity of Phenothiazine.**—*Lancet.* **241.** 600–601.

Administration of 1 g. of phenothiazine per 10 lb. body weight over a period of 3–5 days was an effective remedy against threadworms in children in more than 20 cases, but three cases are described where anaemia resulted after its use, and in two cases toxic hepatitis also occurred.—R. Allcroft.

Pillemer, L., Seifter, J., Kuehn, A. O., & Ecker, E. E. (1940). **Vitamin C in Chronic Lead Poisoning. An Experimental Study.**—*Amer. J. med. Sci.* **200.** 322–327.

The degree of lead poisoning in g. pigs receiving basic lead carbonate, was much less severe in two groups of 26 which were given vitamin C at a saturation level (10 mg. daily) than in two groups of 44 animals on a low vitamin C intake (0·5 mg. daily); the vitamin was given for a period of one month before administration of the lead carbonate. In contrast to the prophylactic action of ascorbic acid, no beneficial therapeutic effect was observed when the vitamin intake was raised to saturation level after development of definite plumbism, nor was a high vitamin intake significantly protective against loss of weight, anaemia, and appearance of stippled cells. The complementary activity of the serum of the animals with lead poisoning was parallel to the ascorbic acid concentration of the serum and was not influenced by the lead intake.—R. Allcroft.

Chick, H., & Ellinger, P. (1941). **The Photo-Sensitizing Action of Buckwheat** (*Fagopyrum esculentum*). — *J. Physiol.* **100.** 212–230.

It has long been known that fagopyrism is liable to arise in domestic animals which have eaten buckwheat when the unpigmented or lightly pigmented parts of their skin are subsequently exposed to sunlight, and the condition has been successfully reproduced in albino members of certain laboratory species.

Using erythema of the naked parts of the skin as the criterion of sensitivity, albino rats and mice were sensitized to sunlight by minimum doses of about 0·25 g. (young) dried buckwheat flowers per 100 g. body weight. Demonstrable quantities of the sensitizing agent were present in the husk of the "seed", but were absent from the leaves and stem. The agent could be extracted with a 9 : 1 mixture of glacial acetic acid and either methyl alcohol or glycol, and the light rays producing erythema appeared to lie between wavelengths of 5,400 and 6,100 Å. The urine and faeces of sensitized rats did not produce sensitivity when fed to

other animals. Conjunctivitis, loss of corneal reflex, dermatitis, and convulsive fits occurred in animals which were subjected to long exposure or to heavy dosage. The length of the sensitivity period varied from 7–32 days according to dosage.—ALASTAIR N. WORDEN.

MÓCSY, J. (1941). Glycerines enyv, mint védőkenőcs mustárgáz ellen. [**Glycerin Mucilage as Protection Against Mustard Gas**].—*Állatorv. Lapok.* **64.** 37–38. [Abst. from abst. in *Dtsch. tierärztl. Wschr.* **49.** 404].

An impermeable layer which prevents the penetration of mustard gas on to the legs of horses was made by painting on 2–3 layers of a glycerin mucilage prepared by mixing a mucilage in water, boiling, and adding glycerin. The material sets into a firm layer which is not easily scraped off, but which can be removed by warm water. Painting of the layer with formaldehyde makes it still more durable.

THERAPEUTICS

I. WEIRETHER, F. J., ANDERSON, E. O., JOHNSON, R. E., PLASTRIDGE, W. N., & JUNGHERR, E. (1941). **Preliminary Report on the Effect of Colloidal Silver Oxide on Bovine Mastitis.**—*Amer. J. vet. Res.* **2.** 141–144.

II. KLEIN, L. A., KLECKNER, A. L., & BILTZ, R. O. (1941). **Effect of Novoxil Liquid on Catarrhal (Chronic) Mastitis and on Streptococcus Agalactiae Udder Infection.**—*Ibid.* 145–151.

I. Four cows with streptococcal mastitis were treated by infusion of the mammary gland with a suspension of colloidal silver oxide in a mineral oil. Success of the treatment was assessed by cultural examination of the milk for *Streptococcus agalactiae*. Injections of the drug into the milk sinus in concentrations of 1–10% and in amounts of 10 ml. produced congestion of the gland, while clots appeared in the milk which was reduced in amount. The treated quarters were freed from infection for up to 37 days and the milk quickly returned to normal, both in appearance and amount, on cessation of treatment. The authors suggest that the organism was re-established either from without, or from remote foci in the mammary tissue unaffected by the drug. A single case of coliform mastitis responded to similar treatment.

II. Twenty-three cows, with *Str. agalactiae* mastitis, were treated with novoxil, a dispersion of colloidal silver oxide in a light mineral oil. Of 67 infected quarters, 19, representing ten cows, showed clinical symptoms of chronic mastitis. Novoxil, in quantities of 5–20 ml. and in concentrations of 2·5, 3, 5, and 10% was injected through the teat canal into the milk sinus of the infected quarter immediately after milking. 1–10 injections were given at intervals of 12, 24, 48, and 72 hours. Swelling of the mammary tissue and alteration in the character of the milk resulted from the injection, but within 12 days these returned to normal. Examination of the udders of 11 cows at slaughter revealed no macroscopic lesions other than staining of the mammary tissues by the silver oxide. Within five days most of the drug had been excreted in the milk, although small amounts could be detected for some weeks. *Str. agalactiae* was eliminated from 59 of the infected quarters and 19 cows were entirely freed from infection. In ten of the 19 clinically affected quarters, symptoms were relieved and the organism destroyed. A single course of injections was given to all cows but eight, five of which were given repeated courses while three received a single injection during the dry period, with promising results, the drug being left in the quarter. From the small number of cases treated, it was concluded that 10 ml. of the 5% and also of the 2·5 and 3% dispersions injected from 3–5 times at 24-hour intervals would give satisfactory results in lactating cattle affected with this form of mastitis.

—K. C. SELLERS.

*HEIDRICH, H. J. (1939). Versuche über die Ausbreitung kleinerer Infusionsmengen im Hohlraumsystem erkrankter Euterviertel. [**The Spread of Small Amounts of Infused Fluid in the Interior of a Diseased Udder Quarter**].—*Inaug. Diss., Berlin.* pp. 57. [Abst. from abst. in *Jber. Vet.-Med.* **66.** 374].

Fifty udder quarters in 40 slaughter cows were partly infused with Congo red gelified solution, with aqueous Congo red or with " Argento-Weidnerit ". Penetration was equally fast with all three and some leakage

occurred if there was a lapse of some time between infusion and slaughter. In quarters of average to large size 200 ml. were not sufficient to penetrate throughout, even with the aid of massage. The makers' claim that "Argento-Weidnerit" can penetrate completely owing to its volatile thiocyanic acid content was not confirmed.

The degree of mastitis has a great influence on penetration, established and chronic cases causing greater obstruction to the passage of infused fluid.

KAREL, L., GRUBB, T. C., & CHAPMAN, C. W. (1941). **The Treatment of a Group C Streptococcus Infection in Guinea Pigs with Vitamin C and Sulfanilamide.**—*J. infect. Dis.* **69.** 125–130.

Sulphanilamide was effective in the treatment of a group C streptococcus infection in g. pigs, but neither high ascorbic acid content nor ten days' vitamin C depletion influenced the effect of sulphanilamide. In the absence of sulphanilamide treatment, the course of the infection was not influenced by either high ascorbic acid content or by ten days' vitamin C depletion.—J. M. ROBSON.

PERLMAN, H. H., BROWN, H., RAIZISS, W., & RULE, A. (1941). **Chemotherapy of Experimental Tuberculosis.**—*Amer. Rev. Tuberc.* **44.** 83–91.

In a series of experiments with g. pigs, the authors tested the effects of various chemical compounds on the course of TB. The subcutaneous administration of 5% menthol, thymol, eucalyptol, and cinnamic aldehyde resulted in a milder infection and an increased longevity as compared with the reactions of similarly infected but untreated control animals. When 10% menthol and thymol were used separately the results were less striking; 10% eucalyptol alone and in combination with menthol and thymol gave variable and less satisfactory results. Longevity in some cases was 2–2½ times that of control animals.

No effect on the longevity, loss of weight, or the course of disease was observed in animals treated with alkyl phenols and their halogenated compounds or with the amino acids cystine, alanine, glycine, and asparagine.—C. P. C.

I. RAISTRICK, H., & SMITH, G. (1941). **Anti-Bacterial Substances from Moulds. Part I. Citrinin, a Metabolic Product of *Penicillium citrinum* Thom.**—*Chem. Indust.* **60.** 828–830.

II. OXFORD, A. E., RAISTRICK, H., & SMITH, G. (1942). **Anti-Bacterial Substances from Moulds. Part II. Penicillic Acid, a Metabolic Product of *Penicillium puberulum* Bainier and *Penicillium cyclopium* Westling.**—*Ibid.* **61.** 22–24.

III. OXFORD, A. E. (1942). **Anti-Bacterial Substances from Moulds. Part III. Some Observations on the Bacteriostatic Powers of the Mould Products Citrinin and Penicillic Acid.**—*Ibid.* 48–51.

I. Results are given of a preliminary investigation of the antibacterial properties of citrinin, a metabolic product of the mould *P. citrinum* Thom. The antibacterial potency of the filtered metabolism solution was assayed against a 24-hour culture of *Staphylococcus aureus*. With one strain of this organism complete inhibition of growth was observed at all dilutions up to and including 1 : 160 with partial inhibition up to 1 : 320; with another strain complete inhibition at 1 : 160 and partial inhibition up to 1 : 240 were obtained. By comparison, solutions of penicillin [see *V. B.* **12.** R_1–R_6] inhibited growth at dilutions up to and including 1 : 640 with an occasional maximum titre of 1 : 1,280. Although the anti-bacterial potency of citrinin is not nearly as great as that of penicillin, it has many points in its favour if later tests prove it to be of value as a chemotherapeutic agent. The mould *P. citrinum* is of very common occurrence, and forms citrinin on a variety of simple, inexpensive, synthetic media, from all of which it is readily isolated in an almost pure state by simple acidification of the filtered metabolism solution with HCl, and it keeps indefinitely with only slight change in colour. The nature of the antagonism between micro-organisms is briefly discussed.

II. Antibacterial properties of cultures of *P. cyclopium* Westling were investigated and found to inhibit the growth of one strain of *Staphylococcus aureus* completely at dilutions up to 1 : 80 and partially at dilutions up to 1 : 320; growth of another strain of *Staph. aureus* was inhibited completely at dilutions up to 1 : 160 and partially up to 1 : 320. Tests against *Bacterium coli* showed that growth of this organism was inhibited completely at dilutions of 1 : 110 and partially at 1 : 210.

The antibacterial activity of cultures of *P. cyclopium* was shown to be due to the presence in them of a metabolic product, penicillic acid, which is quite distinct from, and bears no known relationship to, penicillin. Penicillic acid was first isolated and named by ALSBERG & BLACK (1913) from a mould *P. puberulum*. Later (1935) OXFORD and RAISTRICK found that cultures of *P. cyclopium* also produced relatively large amounts of penicillic acid. The properties and molecular constitution of penicillic acid are given and it may be regarded as the β-methyl ether of γ-hydroxy-γ-isopropylidene tetronic acid. Other derivatives of tetronic acid were isolated from cultures of *P. Charlesii* which are shown to have no appreciable antibacterial action, nor had dihydropenicillic acid. These results indicate that the tetronic acid molecule *per se* is not responsible for the antibacterial activity of penicillic acid. ALSBERG & BLACK (1913) showed that the lethal subcutaneous dose of penicillic acid for mice was about 0·3 g. per kg. body weight which is similar to that of phenol, but phenol completely inhibits the growth of *Staph. aureus* at concentrations of 1 : 500 whereas pure penicillic acid completely suppressed growth at 1 : 50,000. Penicillic acid is much more active against Gram-negative bacteria than is penicillin, and is readily isolated from the metabolism solution of *P. cyclopium* which grows well on simple media and is very stable in laboratory culture.

III. The results are given of preliminary trials of the inhibitory effect of pure preparations of citrinin and penicillic acid on the growth of various representative bacteria. A sterile glucose broth to which were added known volumes of a heat-sterilized dilute aqueous solution of citrinin or penicillic acid, was used for testing the bacteriostatic action of the mould products, but a plain broth containing no glucose was also used for measuring the activity against a few organisms. The bacteriostatic action of phenol and *p*-benzoquinone against two organisms was compared with that of the test substances. The results indicate that citrinin exerts a selective bacteriostatic action on Gram-positive bacteria, while penicillic acid, like phenol and *p*-benzoquinone, has a more widespread action, and is particularly active against members of the colon-typhoid-salmonella group of Gram-negative organisms. Penicillic acid was more effective in glucose broth medium than in plain broth and had a much more powerful growth inhibitory effect then either phenol or *p*-benzoquinone, but appearad to be a comparatively poor germicide. The possible relationship between structure and antibacterial activity of penicillic acid is discussed, but it is not known which feature or combination of features of this comparatively simple molecule is responsible for its antibacterial properties.—R. ALLCROFT.

MCILWAIN, H. (1941). **Antibacterial Action of Two Bacterial Products of Known Structure.**—*Nature, Lond.* **148.** 628.

The structure and chemical composition is given of two pigments isolated from microorganisms which have an inhibitory action against Gram-positive organisms. Pyocyanin is already known to inhibit bacterial growth [see *V. B.* **12.** R_1–R_8.] and as the two pigments described are also phenazine compounds there are thus three known types of naturally occurring phenazine compounds, all bacterial pigments, which are capable of inhibiting the growth of other organisms.—R. ALLCROFT.

JAHNEL, F. (1940). Ueber die chemotherapeutischen Eigenschaften des Indiums bei experimenteller Syphilis und Trypanosomenkrankheiten. [**Chemotherapeutic Properties of Indium in Experimental Syphilis and Trypanosomiasis**]. —*Z. ImmunForsch.* **98.** 112–123.

In view of the report of LEVADITI *et al.* that indium tartrate was active both as a curative and preventive of *T. evansi* infections in mice, the action of indium chloride and indium sodium thiosulphate on various spirochaetal and trypanosome infections was investigated.

The drugs appeared to have no action on rabbit syphilis or *Treponema recurrentis*, nor on the strain of *Trypanosoma evansi* used by J. It did, however, appear to prolong life in *T. brucei* and *T. equinum* infections of mice, and it definitely delayed death in infections due to *T. equiperdum*, although it appeared to have little real curative value.—U. F. RICHARDSON.

I. FOSTER, A. O., CHRISTENSEN, J. F., & HABERMANN, R. T. (1941). **Treatment of Coccidial Infections of Lambs with Sulfaguanidine.**—*Proc. helminth. Soc. Wash.* **8.** 33–38.

II. WHITNEY, L. F., & WHITNEY, G. D. (1941). **Evaluation of Sulfaguanidine in the Treatment of Canine Coccidiosis.** —*Vet. Med.* **36.** 580.

I. Sulphaguanidine, when administered in daily doses of 2 g. to lambs, prevented the acquirement of natural coccidial infections as well as reducing existing subclinical natural infections. Daily doses of 1 g. per lamb reduced oocyst production for the duration of treatment. These dosages did not interfere with the growth or development of the lambs during the experimental period.

II. Naturally infected puppies were treated with sulphaguanidine at the rate of 1 g. per lb. body weight without obvious effect on the course of the disease.—C. HORTON SMITH.

COGGESHALL, L. T., & MAIER, J. (1941). **Determination of the Activity of Various Drugs against the Malaria Parasite.**—*J. infect. Dis.* **69.** 108–113.

The high percentage of relapses which occur after therapeutic treatment in human beings infected with malaria and free from the possibility of reinfection, show that however efficient anti-malarial drugs are in treatment they fail to eradicate infection. The present work sets out to determine the possibility of assaying the value of drugs by comparing their effects on the respiration of plasmodia *in vitro* with their therapeutic effects on experimental infection in canaries, etc. The effects of nine different drugs on the respiration of the parasites *in vitro* showed no uniform correlation with the responses of hosts experimentally infected with five different species, and it was therefore concluded that inhibition of respiration *in vitro* should not be regarded as the sole criterion of chemotherapeutic efficiency, but that it should be used in conjunction with *in vivo* experiments.—C. HORTON SMITH.

KIKUTH, W. (1941). Die Behandlung der Piroplasmosen mit Acaprin. [**Treatment of Piroplasmosis with Acaprin**].—*Dtsch. tierärztl. Wschr.* **49.** 190–192.

Acaprin can be given subcutaneously or intramuscularly. It is specific against piroplasms but has no effect against anaplasmosis. A single dose is usually sufficient to produce a clinical cure, but in some cases the dose must be repeated. Toxic effects are occasionally seen especially with high doses. These consist of increased motor activity, muscular tremors, salivation, air hunger, and passage of faeces. They can be largely prevented by giving the dose in two or three injections at intervals of 2–3 hours.—J. M. ROBSON.

BOLEY, L. E., LEVINE, N. D., WRIGHT, W. L., & GRAHAM, R. (1941). **Phenothiazine in the Treatment of Gastro-Intestinal Parasites of Animals.**—*Proc. Ohio St. vet. med. Ass. 1941.* pp. 63–87.

Trials were carried out on goats, sheep, horses, and pigs and were in the main confirmatory tests of the results of other workers. The findings in brief were :–

Autopsy of seven treated sheep resulted in the detection of only one *Haemonchus*, whereas in all five controls small numbers of *Haemonchus* and *Oesophagostumum* were present. Four clinically affected lambs showed a fall in the egg content of the faeces, improvement in conditon, and a rise in the erythrocyte count. Fourteen treated goats showed reductions in faecal egg counts. Treatment of horses was shown to result in a marked fall in numbers of strongyle eggs and in a reduction of the erythrocyte count and of the haemoglobin index. The egg count of ascarids was not reduced. In pigs a reduction in the count of ascarid eggs was shown to follow treatment.
—W. J. IRONSIDE.

I. HOWELL, C. E., & BRITTON, J. W. (1940). **A Field Trial with Phenothiazine as an Equine Anthelmintic.**—*Cornell Vet.* **30.** 526–532.

II. ERRINGTON, B. J., & WESTERFIELD, C. (1940). **Phenothiazine as an Anthelmintic for Horses and Mules.**—*Vet. Med.* **35.** 688–693.

I. Phenothiazine was administered to 45 pure-bred Arabian horses including pregnant mares, mares with unweaned foals, and yearlings. The dose given to adults was 70–80 g. and to the young stock 45 g. ; this was mixed in the food without preliminary starvation. Twenty-eight controls were kept.

The results, based on faecal egg counts and the examination of faeces for worms, gave a strong indication of the drug's effectiveness against strongyles and *Trichostrongylus axei*. Ascarids were unaffected.

No signs of toxicity were observed in any of the animals.

II. The authors treated 55 horses and mules with commercial phenothiazine, the drug being given in the grain feed without fasting. Unweaned foals were dosed by stomach tube and funnel.

The treatment was highly effective against mature strongyles, a dose of 30–45 g. being

sufficient for yearling thoroughbreds and one of 60 g. for mature thoroughbreds and average sized farm horses. The foals were given 10 g. but this treatment was less effective than that of the other horses. Weekly egg counts remained low for six weeks after treatment but gradually increased after that.

For approximately four weeks after treatment the animals showed a decrease in erythrocyte counts and haemoglobin content of the blood. No other untoward effects were noted, even in animals in poor condition.

The treatment had no effect on bots and very little on ascarids.—K. M. SANDERSON.

I. PORTER, D. A., SIMMS, B. T., & CAUTHEN, G. E. (1941). **Field Tests with Phenothiazine as an Anthelmintic in Cattle.** *J. Amer. vet. med. Ass.* **99.** 272–278.

II. PORTER, D. A. (1941). **Further Tests with Unconditioned Phenothiazine as an Anthelmintic in Cattle.**—*Proc. helminth. Soc. Wash.* **8.** 38–41.

I. Two tests were carried out. In one, 9 two-year-old Hereford bulls were treated with doses of 0·25–0·49 g. per lb. body weight. Administration was by capsule or in the food after a fast of 24 hours. The only ill-effects observed were lack of appetite and sluggishness on the day following treatment. Egg counts made at intervals up to 18 weeks after treatment showed the counts to be much reduced two days after treatment and at the end of 18 weeks to be still much below the pre-treatment level. The erythrocyte content of the blood was raised at the end of two weeks and further raised at the end of six weeks.

The other tests were carried out on yearlings that had already been treated with "cunic mixture" (copper sulphate 1·5%, nicotine sulphate 0·6%) and were showing clinical symptoms of emaciation, scouring, and paleness of mucous membranes. Five were treated with phenothiazine in doses of 40–60 g. and the remainder, with the exception of three left as controls, were treated again with "cunic mixture". Egg counts made nine days and 17 days after treatment showed these to be lower in the phenothiazine-treated than in the other animals.

II. Critical tests were carried out on six cattle with the object of determining the efficiency of doses smaller than those commonly employed. Phenothiazine, in doses of 0·05–0·2 g. per lb. body weight, was administered either in gelatin capsules or mixed with the feed, some animals being treated without previous fasting and others after fasting for 16 hours. The number of parasites passed after treatment was determined as also was the number found present at P.M. examination carried out 7–11 days after treatment.

Treatment succeeded in the removal of 100% of *Haemonchus* in all doses, of 100% of *Oesophagostomum* except at the lowest dose, and of 100% of *Ostertagia* in the highest dose only. It failed in the removal of *Trichuris*, *Capillaria*, *Nematodirus*, *Strongyloides*, and *Cooperia*. No difference in effect was noted between administration by capsule and in the feed, or between fasting and not fasting before treatment.

Treatment of two animals in a field test with a dose of 0·1 g. per lb. body weight resulted in a fall in the worm-egg count, a rise in erythrocyte count, and improvement in condition.

W. J. IRONSIDE.

I. STEWART, W. L., & CROFTON, H. D. (1941). **Parasitic Gastritis in Sheep. Comparative Trials on Lambs with Phenothiazine and Copper-Nicotine Mixture.**—*Vet. Rec.* **53.** 167–170.

II. BODDIE, G. F., CORNER, H. H., MORGAN, D. O., & SLOAN, J. E. N. (1941). **Field Trials with Phenothiazine on Lambs.**—*Ibid.* 170–173.

I. The authors observed an improvement in condition after treatment with either anthelmintic in flocks of lambs with subclinical parasitism. The weight increase was slightly larger with phenothiazine. It was found by egg counts and P.M. examination that phenothiazine was more efficacious against the pathogenic *Ostertagia* species and *Trichostrongylus axei*, whilst the copper-nicotine mixture was effective against *Nematodirus* and *Moniezia*. A combination of both anthelmintics was tried and found to be less efficient than phenothiazine alone.

II. The authors describe trials providing further evidence of the superiority of phenothiazine over copper-nicotine mixture as an anthelmintic for sheep. Weights, egg counts and worm counts at P.M. examinations are recorded.—K. M. SANDERSON.

SCHMID, F., & KRAUSE, M. (1941). Die Wirkung von Wurmmitteln auf die verschiedenen Strongylidenarten des Pferdes. II. Arsinosolvin und Equiver-

mon. **[Action of Anthelmintics on the Various Horse Strongyles. II. "Arsinosolvin" and "Equivermon"].**—*Dtsch. tierärztl. Wschr.* **49.** 132–133. [For part I, see *V. B.* **11.** 559].

The authors tested the anthelmintic action in horses of these two proprietary products. Egg counts were made from faecal samples taken on three successive days and the proportion of the various worm species present was determined by faecal culture and larval differentiation. These counts were made before dosing and at an interval of three weeks after dosing. Four horses were treated with "arsinosolvin" intravenously, four with "equivermon" *per os*, and two with a combination of both.

"Arsinosolvin" reduced the egg counts by 50–70%, the species chiefly affected being *Trichonema* spp. with a slight action on *Strongylus vulgaris*. "Equivermon" reduced egg counts by 75–85%, the chief action again being on *Trichonema* spp. with some effect on *S. edentatus*. The combination of treatments did not give superior results.—H. E. HARBOUR.

*CSEMBA, J. (1940). **[Anti-Parasitic Action of Oil of Chenopodium and its Constituent Parts in Swine].**—*Thesis, Budapest.* [Abst. from abst. in *Berl. Münch. tierärztl. Wschr.* Aug. 29th. 427. (1941)].

In vitro tests on *Ringwürmer* [*? Ascaris*] showed that constituent fractions of oil of chenopodium distilled out at a low temperature were less lethal than the oil itself, whilst those distilled out at a high temperature were more effective than the oil itself.

In tests on infested pigs, chenopodium and castor oils in combination were ineffective, but the high temperature distillate of oil of chenopodium plus castor oil was effective.

MARTIN, G. J., THOMPSON, M. R., & ACCOUSTI, N. J. (1941). **Therapeutic and Prophylactic Detoxication, Anthelmintics.**—*Amer. J. Hyg.* Sect. D. **34.** 23–35.

Certain anthelmintics are known to be toxic and at the same time to have a low chemotherapeutic index. In an attempt to decrease the toxicity by the administration of detoxifying compounds, the action of about 50 physiological detoxifying agents and combinations of these agents was investigated in mice against acutely toxic doses of ascaridole, aspidium and tetrachlorethylene. The chemotherapeutic effect of the drugs was checked on *Ascaris* by the *in vitro* method of LAMSON & BROWN [*V. B.* **7.** 36.] and the dietary régime of the mice was controlled by maintaining them on a stock diet for several days and then placing them on a maintenance diet of unpolished rice. The detoxifying agents were given orally suspended in gum tragacanth; ascaridole and aspidium were given in the same solution as the detoxifying agents, but tetrachlorethylene was administered subcutaneously. Cystine, glycine, ascorbic acid, and calcium glucuronate were the most effective detoxicants and a mixture of these compounds was generally more effective than any single one. These substances are used by the body in the normal processes of detoxication and administration of them at the same time as toxic anthelmintics reinforces the body's own natural defence against toxic chemicals. The anthelmintic effect of ascaridole was affected adversely by the simultaneous administration of the detoxicants, but activity was enhanced in the case of tetrachlorethylene. Interference with anthelmintic effectiveness could be avoided by giving the detoxicants after administration of ascaridole.—R. ALLCROFT.

LANDSBERG, J. W., & LISCHER, C. F. (1941). **Anthelmintic Studies on the Mono Ethers of the Dihydroxy Benzenes.**—*J. Parasit.* **27.** 357–361.

The anthelmintic activity of 14 compounds of the mono ethers of dihydroxybenzene was tested by the *in vitro* method of LAMSON & BROWN [*V. B.* **7.** 36.] using *Ascaris lumbricoides* of swine as the test organism. Mono-*n*-hexyl ether had the greatest activity. Its killing power and toxicity were approximately the same as those of hexylresorcinol and it is suggested that this compound merits further *in vivo* investigation.—R. ALLCROFT.

MIDDLETON, S., & GILLILAND, I. C. (1941). **Prevention of Droplet-Borne Infections by Spray. A Field Experiment.**—*Lancet.* **241.** 598–599.

Army huts used by about 3,000 men were sprayed three times daily for three months with a hypochlorite solution by means of a simple sprayer of the "Flit-gun" variety. The huts of an equal number of men were not sprayed and served as controls. The total number of cases of droplet-borne diseases reporting sick in the sprayed community was 425 compared with 670 in the unsprayed group. A detailed

study of the figures from individual batteries indicates that the 37% reduction in the incidence of droplet-borne diseases in the sprayed group is not as significant as it appears, but there is some evidence that this method is capable of diminishing the spread of droplet-borne infections.—R. ALLCROFT.

KLIEWE, H. (1940). Ueber den Einfluss von organischen und anorganischen Stoffen auf die keimtötende Kraft von Desinfektionsmitteln. [**Influence of Organic and Inorganic Substances on the Germicidal Effect of Disinfectants**].—*Zbl. Bakt. I.* (*Orig.*). **146.** 208–214.

The germicidal effect of various organic and inorganic proprietary germicidal products was investigated in the presence of faeces, pus, vomit, etc. The composition of the antiseptic products is not given.—J. M. ROBSON.

*SIEVERT, H. (1940). Das Bienengiftpräparat Forapin in der Veterinärchirurgie. [**Forapin, a Preparation of Bee Venom, in Veterinary Surgery**].—*Inaug. Diss., Hanover.* [Abst. from abst. in *Dtsch. tierärztl. Wschr.* **49.** 112].

Bee venom has been used empirically in human influenza and was first tried in veterinary medicine by BEZEL and by WAGNER for large indolent wounds and fistulous withers.

S. tested forapin in ointment, solution, and powder form. Eighteen pharmacological and 15 therapeutic tests were made on horses at the surgical clinic, Hanover veterinary college. In the first series of tests it was found that forapin when rubbed into the skin had a local irritant effect. Biopsy revealed an intense inflammation. Forapin administered intravenously had no effect in the doses used (up to 1,755 bee venom units). When it was applied in powder form to small fresh wounds, rapid healing resulted [but apparently not abnormally rapid healing].

Therapeutic tests were carried out on three cases of scar keloid, six of lacerated wounds, four of fistulous withers, and one each of "summer sores" and chronic verrucose dermatitis. When injected [route not stated], forapin appeared to favour the sloughing of necrotic tissue in fistulous withers and caused rapid granulation of lacerated wounds when applied direct. Forapin ointment under a pressure bandage gave good results with keloids, lacerated wounds, and "summer sores". The powder was a very good tissue stimulant in cases of open wounds. S. concludes that forapin is useful in veterinary surgery.—J. E.

GARROD, L. P. (1940). **Prevention and Treatment of Wound Infection. IV. Action of Antiseptics on Wounds.**—*Lancet.* **238.** 798–802. [See also *V. B.* **11.** 716].

In addition to the action on bacteria two factors are of the greatest importance in assessing the value of an antiseptic, namely the reaction with organic matter and the toxicity of the substance, especially its effect on healing tissues. Six main classes of antiseptics have to be considered, *viz*, oxidizing agents, halogens, heavy metal compounds, coal tar derivatives (lysol, halogenated cresol preparations, etc.), dyes (di- and tri-phenylmethane compounds), and acridine compounds (of which proflavine is the compound of choice). The rate of action, efficiency as measured by maximal bactericidal dilution, toxicity, and degree of loss of efficiency in the presence of organic matter of these various substances are discussed.—J. M. ROBSON.

HAWKING, F. (1941). **Methods for the Local Application of Sulphanilamide.**—*Brit. med. J.* Nov. 15th. 685–686.

Methods are described for the local application of sulphanilamide (a) as a powder to open wounds, (b) as tablets or on gauze to deep sinuses, and (c) as various kinds of paste to treat inflamed surfaces, burns, and wounds which must be packed. The pastes contain 30% sulphanilamide made up with various ingredients (cod liver oil, oleic acid, triethanolamine, cetyl alcohol, beeswax) and are being further investigated. From some of the pastes sulphanilamide is rapidly liberated.—J. M. R.

NEUFELD, F., & BÄR, F. (1940). Untersuchungen über die Wirkungsweise der Sulfonamide. [**Research on the Mode of Action of Sulphonamides**].—*Z. Hyg. InfektKr.* **123.** 116–125.

Some evidence is given for the view that when sulphonamides, and especially prontosil, act *in vivo*, a chemical change of at present unknown nature occurs. Under these circumstances the substances can increase the phagocytosis of bacteria. The effect is due to an action not on the leucocytes but on the bacteria, *i.e.* it is in the nature of an "opsonic" effect.—J. M. R.

SUNDERMAN, F. W., PEPPER, D. S., & BENDITT, E. (1940). **Sulfathiazole in Blood and Urine.**—*Amer. J. med. Sci.* **200.** 790–795.

Methods for the estimation of sulphanilamide in whole blood were applied to the determination of sulphathiazole, but recoveries averaged approximately 86% of the theoretical. The loss was found to occur during protein precipitation. When serum was used instead of whole blood the loss of sulphathiazole averaged only about 3%. It is therefore suggested that estimations of sulphathiazole should be made in serum instead of in whole blood. The procedure for serum can be applied to urine determinations. As sulphathiazole and its acetyl derivative are about twice as soluble in urine of pH 7·6 as in urine of pH 5·6, the occurrence of crystalline concretions in the urine is lessened if the urine is kept alkaline and when the volume of urine is increased by adequate ingestion of water.—R. ALLCROFT.

PUBLIC HEALTH

I. *PREUN, B. (1939). Beitrag zur direkten Züchtung der Brucella abortus Bang aus Marktmilch mittels Alkoholvorbehandlung. **[Direct Culture of *Br. abortus* from Market Milk after Preliminary Treatment with Alcohol].**—*Inaug. Diss., Berlin.* [Abst. from abst. in *Berl. Münch. tierärztl. Wschr.* Feb. 28th. 105. (1941)].

II. SÖNTGEN, K. (1940). Die Erfahrungen über die Alkoholvorbehandlung von Milchproben zum Nachweis von Abortus-Bang- und Tuberkelbakterien. **[Experience with Alcohol Treatment of Milk Samples to be Examined for Brucella and Tubercle Bacilli].**—*Z. Fleisch- u. Milchhyg.* **50.** 249–251. [Abst. from abst. in *Berl. Münch. tierärztl. Wschr.* Feb. 28th. 105. (1941)].

I. A comparison of the method of isolation of *Br. abortus* by cultural and animal inoculation methods. After cooling the milk for at least two hours, 60 ml. were mixed with 24 ml. alcohol and 24 ml. carbol-saline and returned to the ice-chest for at least two hours. The mixture was then placed in a shaking-machine for 25 min. and centrifuged in 100 ml. tubes for 25 min. at 3,000 r.p.m. The cream and skimmed milk were discarded and the tubes were stood upside-down to drain over filter-paper. Two or three plates of liver-agar medium (Stockmayer's modification) were sown from the sediment of each tube. The results obtained were not as good from bulked milk samples as from single samples. By the cultural method bulked milk yielded 48·27% and by animal inoculation, 82·7%; single samples yielded 94·11% and 70·57% respectively. The combination of animal inoculation and culture methods is recommended as most suitable for the isolation of *Br. abortus* from milk samples.

II. S. tested FLEISCHHAUER's alcohol method and concludes that the preliminary addition of alcohol to the milk before testing has little advantage over usual methods.

—E. C. HULSE.

LERCHE. (1941). Bakterielle Lebensmittelschädigungen, ihre Ursachen und ihre Verhütung. **[Bacterial Damage to Foodstuffs, Including Meat Poisoning; Causes and Prevention].**—*Berl. Münch. tierärztl. Wschr.* May 23rd. 253–255.

This is an informative review of meat poisoning and its control in Germany. Figures are given showing the relative importance of the various animal products as causes of outbreaks and individual cases. Ox meat is the most important source of outbreaks and pig meat the next, whilst ox meat followed by horse meat are the most important as causes of individual cases. Sausage and minced meat are also involved in meat poisoning to an appreciable extent.

Salmonella infection accounts for two-thirds of all cases and botulism plus saprophytic infections for the remainder. L. describes how such meat poisoning occurs and reviews the German methods of prevention put into force largely through the meat inspection law. Success in control has increased considerably in recent years and the few outbreaks which now occur are mainly due to the laxity of an individual concerning the legally prescribed action.—J. E.

LÜTJE, F. (1941). Nochmals über die Enteritisvorkommnisse beim Schwein und die sich daraus ergebenden praktischen Folgerungen. **[Salmonella In-**

fection in Swine].—*Berl. Münch tierärztl. Wschr.* June 13th. 288–292.

This is a discussion, partly historical, concerned especially with food poisoning resulting from the consumption of meat from pigs affected with various bacterial conditions causing enteritis, and with the significance of these infections in meat inspection laws.

—D. L. ROBARTS.

*MULLER, A. H. (1941). Die Nahrungsmittelvergiftungen durch Enteneier. [**Food Poisoning From Duck Eggs**].—*Münch. med. Wschr.* 125–127. [Abst. from abst. in *Zbl. Bakt. I.* (*Ref.*) **140.** 67].

A clinical report of 23 cases of food poisoning admitted to a Hamburg hospital, each with a history of having eaten raw duck eggs. *Salmonella typhi-murium* was isolated from 18 cases, *S. enteritidis* from two, and *S. paratyphi-B* from one, the results in the remaining two being negative.

I. VAN DEN ENDE, M., EDWARD, D. G. ff., & LUSH, D. (1941). **Reduction of Dust-Borne Infection by Treatment of Bedclothes.**—*Lancet.* **240.** 716–718.

II. VAN DEN ENDE, M., & SPOONER, E. T. C. (1941). **Reduction of Dust-Borne Bacteria in a Ward by Treating Floor and Bedclothes.**—*Ibid.* 751–752.

III. THOMAS, J. C., & VAN DEN ENDE, M. (1941). **The Reduction of Dust-Borne Bacteria in the Air of Hospital Wards by Liquid Paraffin Treatment of Bedclothes.**—*Brit. med. J.* June 28th. 953–958.

IV. THOMAS, J. C. (1941). **Reduction of Dust-Borne Bacteria by Oiling Floors.**—*Lancet.* **241.** 123–127.

V. BAKER, A. H., & TWORT, C. C. (1941). **The Effect of Humidity of Air on the Disinfection Capacity of Mechanically Atomized and Heat-Volatilized Germicidal Aerosols.**—*J. Hyg., Camb.* **41.** 117–130.

I. Attempts to render textiles bactericidal with various antiseptics were unsuccessful, but when woollen and cotton materials were treated with 30% medicinal paraffin dissolved in white spirit, the amount of dust which could be liberated from them by shaking was reduced by about 90%. This treatment did not render them objectionably oily.

II. Bedclothes in hospital wards were treated with liquid paraffin as described in I and floors oiled with spindle oil [a crude, heavy petroleum oil used extensively in the cotton industry as a lubricant]. The results showed that oiling the floors alone did not significantly reduce the number of dust-borne organisms in the air, but the treatment of both floor and bedclothes resulted in a definite reduction in the number of bacteria. which could be recovered.

III. A description is given of experiments to reduce dust-borne infection in hospital wards. It is demonstrated that many organisms are projected into the air every time a bed is made or in any way disturbed. It is suggested that the treatment of bedclothes with liquid paraffin, as described in I, combined with the use of spindle oil on floors [see also VAN DEN ENDE *et al.*—*V. B.* **11.** 256.] reduces greatly the number of organisms distributed in the air and may assist in reducing the incidence of cross-infection.

IV. The effect of spindle oil on wood and linoleum floors was tested over a period of months and in every case the treatment of the floors resulted in approximately 80% reduction in the number of organisms (both the common dust saprophytes and pathogenic streptococci) projected into the air by sweeping. The effective period of the oil increased with each application up to a maximum of about two months, depending on the amount of traffic on the floor. The oil can be applied to all wood floors provided polish is removed beforehand, and to either glossy or cork-inlaid linoleum ; if used directly on concrete it soaks in rapidly and the effect is soon lost. The basis for primary application is 1 gal. per 800–1,000 sq. ft. floor space.

V. In the course of experiments on the lethal effectiveness of organic smokes on bacteria in the air [see TWORT *et al.*—*V. B.* **11.** 322.], difficulty was experienced in obtaining satisfactory results. Investigation showed that the humidity of the atmosphere being disinfected markedly affects the result of the operation ; more effective " kills " were obtained when the relative humidity was increased from 40–60% or higher. The magnitude of the effect of increasing the relative humidity was not similar with all types of germicidal aerosols used, nor was it similar on all types of test organisms used (flora of normal salivas, *Bacterium coli*, and the " F " coccus, a white

Gram-positive micrococcus). No definite recommendations can be given regarding the percentage relative humidity, germicide, and method of generating aerosol to obtain maximum disinfection of air until more data have been obtained concerning the chemical composition and physical behaviour of the operative germicide particles. [See also *V. B.* **11.** 643.]

TECHNIQUE AND APPARATUS

KUNZ, O. (1941). Ein einfaches und billiges Verfahren zur Herstellung einer Kohlensäureatmosphäre für Bakterienzüchtung. [**A Simple and Cheap Method of Obtaining a CO_2 Atmosphere for Bacterial Cultivation**].—*Zbl. Bakt. I. (Orig.)* **147.** 206–208.

Pure solid paraffin, m. p. 46°–48°C., is melted in the lid of a petri dish, and a wick arranged to stick up from the centre of the paraffin, which is then allowed to solidify. This paraffin "candle" is put, along with inoculated culture media, into a large glass jar, and lit; the jar is loosely closed, until the air inside has warmed up, by a stopper fitted with a rubber washer. The jar is then opened for a few moments to allow some of the air to escape; the stopper is then replaced and soon is held firmly in place by the difference of gas pressure inside and outside the jar, which is now ready for the incubator.—E. COTCHIN.

WOOLLEY, D. W., & HUTCHINGS, B. L. (1940). **Synthetic Media for Culture of Certain Hemolytic Streptococci.**—*J. Bact.* **39.** 287–296.

Studies made on the growth of *Str. symogenes* (Lancefield group D) showed that vitamin B_6 is an essential growth factor when the basal medium contains only known pure chemicals. The necessary substances besides vitamin B_6 were found to be glucose, inorganic salts, isoleucine, lysine, tyrosine, cystine (or methionine or inorganic sulphide), arginine, tryptophane, glutamic acid, riboflavin, pantothenic acid, and "reduced" Fe. Strains of Lancefield group B and D streptococci could also be grown in synthetic medium but members of other Lancefield groups could not. *Str. symogenes* could not grow in the absence of glutamic acid or tryptophane, nor in the presence of these two amino acids when all others were absent. The simplest amino acid mixture consistent with growth was found to contain tryptophane, glutamic acid, isoleucine, lysine, arginine, tyrosine, and cystine.—A. E.

SAHAI, L. (1941). **The Comparative Value of Certain Media for the Isolation of Tubercle Bacilli.**—*Vet. J.* **97.** 218–223. 1 appendix.

S. made a comparative study of the growth of 45 human strains, 69 bovine strains, and 50 avian strains of tubercle bacilli. These comparisons were made between growths on the following media: plain egg, Löwenstein's, Petragnani's, Petroff's, Sweany and Evanoff's, Wenold's, and Holth's modification of Petragnani's medium.

Löwenstein's medium was found to be superior to the others for growth of all types of tubercle bacilli. Growth appeared earliest on this medium; human strains were visible in 8–12 days, avian strains could be seen in 5–7 days, and, while bovine strains did not become visible at any fixed period, they appeared first on this medium.

Although Holth's medium gave slower growths, the ultimate growth was more abundant and the types were characteristically differentiated.—D. L. HUGHES.

HUDSON, R. E. B. (1941). **A Modification of McIntosh and Fildes' Anaerobic Tin.**—*Brit. J. exp. Path.* **22.** 305–308.

Detailed instructions with a diagram are given for improving the anaerobe tin, to enable the user to ascertain the degree of anaerobiosis within. The indicator recommended is 0·5–1·0 ml. of 1·0% glucose beef digest broth, of pH 8·5–9·0 and deeply coloured with methylene blue. This small amount of indicator contained in a suitable container made from glass tubing is suspended vertically on the outside of the tin, but it is in communication with the atmosphere within through a bent piece of compo-tubing soldered into a hole in the wall of the tin near the rim. The tube of indicator may be preserved by the addition of 0·01% merthiolate or phenyl mercuric nitrate, and it is left in place during the repeated use of the tin.

A summary of the correct procedure for using the tin is quoted. When compared with the more expensive glass anaerobe jar and the newer metal one, as regards the minimum time in which anaerobiosis was reached and the growing of contained anaerobe cultures, favour-

able results were obtained with the above modified tin.—J. KEPPIE.

*DIDION, H. (1939). Ueber den fluorescenzmikroskopischen Nachweis von Tuberkelbakterien. **[The Demonstration of Tubercle Bacilli by Fluorescence Microscopy]**.—*Klin. Wschr.* **18.** 1315. [Abst. in *Amer. Rev. Tuberc.* **43.** p. 67 of absts., copied *verbatim*. Signed : H.R.N.]

Fluorescent microscopy has been employed as an alternative method of identifying tubercle bacilli on the slide. The preparation is stained with Auramine, a yellow anilin dye ; when viewed under the microscope, the organisms are colored a yellowish green. In order to determine the accuracy of this method, 702 specimens, including sputum, pus, urine, faeces and other body fluids of suspected tuberculous nature, were examined. These were examined for tubercle bacilli by four methods ; animal inoculation, culture (according to the method of Löwenstein, Lockemann and Hohn), Ziehl-Neelsen stain and Auramine stain according to the method of Hagemann. Altogether there were 157 positive specimens. One hundred and twenty-nine were positive by the Ziehl-Neelsen method, 137 by the Auramine method ; 12 were discovered by cultural methods and 8 were uncovered only by animal inoculation. Of the 157 positive specimens the following figures show the percentage accuracy of the various methods : animal inoculation, 100 ; culture, 92, Auramine, 87·2 ; Ziehl-Neelsen, 82·2. Of the staining methods the Auramine fluorescence method is not only somewhat more accurate but is also definitely time saving particularly in searching for tubercle bacilli in tissue preparations.

*GÄRTNER, H. (1939). Wie hoch ist der Gewinn an positiven Tuberkulosepräparaten durch das Fluoreszenz-Mikroskop ? **[The Number of Positive Diagnoses of TB. by Fluorescence Microscopy]**.—*Z. Tuberk.* **83.** 27. [Abst. in *Amer. Rev. Tuberc.* **43.** p. 67 of absts., copied *verbatim*. Signed : G. C. L.]

The author reviews the literature and his own experience with the fluorescent microscope in the finding of tubercle bacilli in the sputum. Out of 530 examinations with the fluorescent microscope the author had 110 positive results ; out of 530 examinations with a staining method (Jötten Haarman), 100. In the large tuberculosis laboratory the fluorescent microscope has a distinct advantage over the usual staining methods, which is, however, not true for individual examinations.

*SCHNEIDER, P. P. (1940). Fluoreszenzmikroscopie und Tuberkelbazillennachweis im Tuberkulosenkrankenhaus. **[Fluorescence Microscopy in the TB. Sanatorium]**.—*Z. Tuberk.* **84.** 310. [Abst from abst. in *Amer. Rev. Tuberc.* **43.** p. 67 of absts. Signed : G. C. L.]

With this method there is considerable saving of time and less fatigue. In a series of 1,100 examinations there were 22·7% more positive results with the fluorescence microscope than with the Ziehl-Neelsen method. Negative in relation to positive results were : for sputum 3 : 4 with Ziehl-Neelsen and 3 : 5·5 with the fluorescence microscope ; for antiformin concentration 3 : 0·9 and 3 : 1·4 ; for gastric juice 9 : 1 and 8 : 1. The method cannot, however, replace culture and animal inoculation tests.

*SCHALLOCK, G. (1940). Vereinfachter Nachweis von Tuberkelbazillen in histologischen Schnitten durch die Fluoreszenzmethode nach Hagemann. **[Fluorescence Demonstration of Tubercle Bacilli in Histological Sections by Hagemann's Method]**.—*Münch. med. Wschr.* **87.** 102. [Abst. in *Amer. Rev. Tuberc.* **43.** p. 66 of absts., copied *verbatim*. Signed : A. B. T.]

A method of staining is described which allows an improved demonstration of tubercle bacilli in histological sections. The procedure is based on the typical aspect of the bacilli in the fluorescent light when treated previously with Auramine. A fluorochrome such as thiazol-yellow is used as counterstain. The staining takes about twenty minutes. Sections which had been recently stained with haematoxylin or van Gieson may be easily decolorized and restained. The technique can be used for either paraffin or frozen sections. Elastic fibres and cholesterin are known to give a similar fluorescence. The color and shape of the tubercle bacillus, however, should allow the differentiation without difficulties. Particles of tissue which were previously treated with antiformin or material that has been in formalin longer than four or five days are not suitable. The method is recommended though the

experiences so far are based on a limited number of cases.

*SNAPPER, I. (1939). **Note on the Doubtful Propriety of the Eponym Ziehl-Neelsen for the Method of Staining Tubercle Bacilli.**—*Chin. med. J.* **56.** 578. [Abst. from abst. in *Amer. Rev. Tuberc.* **43.** p. 63 of absts. Signed: G. C. L.]

The author relates the history of the development of the Ziehl-Neelsen technique and points out that it is a slight modification of a method described by Ehrlich.

LILLIE, R. D. (1941). **Romanowsky Staining with Buffered Solutions, III. Extension of the Method to Romanowsky Stains in General.**—*Stain Tech.* **16.** 1–6.

Differentiation of stained material by ordinary methods makes it almost impossible to obtain consistent results, but the staining method described in this paper involves no subsequent differentiation with the result that large numbers of sections can be simultaneously carried through the stains from day to day with consistent results. For example, solutions of 0·3 g. of Wright, Giemsa, Leishman, and Balch stains and similar eosinates of thiazine dyes per 100 ml. of a mixture of equal parts of glycerin and methyl alcohol give good results without differentiation when buffered with citric acid and sodium phosphate. Depth, density, and permanence are given to nuclear staining, with some reduction of clarity, by prestaining with alum haematoxylin. Reactions for formalin or Orth's fixative, acid formalin, Zenker's formalin, and ethyl or methyl alcohol or Carnoy's fixative should be at pH 4·2, 4·6, 5·0, and 6·5 respectively. The preparation of the stain toluidine blue phloxinate, which is recommended, is described. For Romanowsky stains, clarite and clarite X were found to be superior as mounting media to neutral Canada balsam, and not quite as good as liquid petrolatum.—C. HORTON SMITH.

RYU, E. (1941). **On the Modification of the Fixation of Bacterial Film for Staining.**—*Jap. J. vet. Sci.* **3.** 299–308. [In Japanese: abst. from English summary].

In the fixing of bacterial films, R. considers the use of acid alcohol to be more thorough and satisfactory than the prevalent use of heat. Films of non-sporing organisms should be covered with 1–2 drops of 0·5% of hydrochloric acid alcohol, and left for a few minutes until dry. Films of sporing organisms should be treated with three drops of the above fixative, which in addition should contain 0·01% mercuric chloride. The films should then be washed lightly with water before staining.—J. KEPPIE.

HILL, D. K., & PINCOCK, A. C. (1941). **Photoelectric Method of Estimating Haemoglobin.**—*Lancet.* **241.** 754–755.

Details are given for the photoelectric determination of haemoglobin by measuring the absorption of green light by the pigment by means of a vacuum photocell in conjunction with a Lindemann electrometer. The colour filter used was an Ilford No. 807 which gives a well-defined band in the green which is sufficiently narrow for Beer's law to be approximately obeyed. By measuring the optical density of samples of blood (20 ml. diluted with 3 ml. of diluting fluid), the actual haemoglobin percentage (Newcomer) can be read from a calibration curve prepared by measuring the optical densities of varying dilutions of whole blood of known oxygen capacity.—J. P. G.

MANTHEI, C. A., & EICHHORN, A. (1941). **Use of Sodium Bifluoride and Sodium Silicofluoride in the Disinfection of Hides.**—*J. agric. Res.* **63.** 41–48.

Experiments were carried out to study the efficiency of sodium bifluoride and sodium silicofluoride as disinfectants of hides against the virus of vesicular stomatitis. Two methods were employed :– (a) infected g. pig pads were soaked for 24 or 48 hours in concentrations of 1 : 5,000, 1 : 10,000, and 1 : 20,000 of the two fluorides in the presence of salt-cured calf skins; (b) sections of salt-cured calf skin were injected intradermally with the virus, in the presence of the solutions, the amount of skin being one-fifth by weight of the solution in all experiments. Tap water was used as control and the work was carried out at room temperature.

With method (a) the bifluoride killed the virus in g. pig pads in 24 hours at all three dilutions; the silicofluoride killed the virus at 1 : 5,000 and 1 : 10,000 within 24 hours, and at 1 : 20,000 within 48 hours. With method (b) the bifluoride killed the virus in the inoculated skins at all dilutions within 48 hours and at the two higher concentrations within 24 hours. The silicofluoride at the higher concentrations killed in 24 hours but was not completely effective at 1 : 20,000 in 48 hours.

Tap water did not affect the virus even after 48 hours of soaking. At equal dilutions the silicofluoride solutions had a higher pH than the bifluoride, but both decreased with standing in the presence of skins, as did tap water. The higher pH did not necessarily indicate greater viricidal powers. By analogy with British work it is assumed that sodium bifluoride and silicofluoride are also effective in destroying the virus of foot and mouth disease.—ALFRED EDEN.

McINTOSH, C. W. [19 -]. **Laboratory Animal Cages.** pp. 14. Ottawa: Science Service, Dominion Department of Agriculture. [4to] [Mimeographed].

Details are given with scale plans and specifications of material required for the construction in tier formation of metal stock and breeding cages for g. pigs and ferrets and of single cages for laboratory animals in general.

Designs have evidently been very carefully worked out with full reference to the housing and handling of the animals as well as to the technicalities of metal work and maintenance. —J. E.

MISCELLANEOUS

HOFFMAN. (1941). Das zivile Veterinärwesen in Belgien. **[Civil Veterinary Affairs in Belgium].**—*Tierärztl. Rdsch.* **47.** 486–489 and 503–504.

By an order of September 14th, 1941 the whole agricultural organization was remodelled under a Minister of Agriculture and Food under whom is the State veterinary service which is organized to control animal diseases and to inspect food of animal origin. The country is divided into nine provinces embracing 17 districts, each district being in charge of a veterinary inspector.

In 1940 there were 727 veterinarians in Belgium, of whom 26 were in the central State service, 26 were teachers, 27 communal meat inspectors, 44 in the army, and 19 in the colonial veterinary service. The rest were in private practice; nearly all the latter carry out meat inspection also.

Veterinary education is given at two colleges at Brussels and at Ghent, teaching being in French and Flemish respectively. The course comprises two preliminary university years in general science and four of veterinary instruction. Horse shoeing is regarded as important and many State farriery schools exist.

In 1938 a veterinary diagnostic and research laboratory was opened at Brussels.

Livestock disease control is based on laws of 1882 and 1894. The following diseases are notifiable:—anthrax, glanders, epizootic lymphangitis, dourine, rinderpest, bovine contagious pleuro-pneumonia, foot and mouth disease, rabies, sheep pox, swine fever, and mange in horses and sheep. The control regulations are outlined. Bovine TB. has been controlled since 1937 by a district voluntary scheme involving annual examinations and tuberculin testing. It has made good progress, so that 8–10% of all *Gemeinden* have been freed from infection. A voluntary control scheme for bovine brucellosis has also been started.

Meat inspection is well provided for at 99 public abattoirs, and is also compulsory for about 15,000 private butchers. It is organized and carried out by veterinarians. The inspection of other foodstuffs is also described, though nothing is said about milk control.

Animal breeding is controlled by the State, which gives substantial financial support. The various breeds of farm animals are described and livestock censuses as before 1940, at June 1st 1940, and at January 1st 1941 are given.

Carcass disposal is a private monopoly and is carried out at five centres at properly equipped plants.—J. E.

PSCHORR. (1941). Die Niederlande und ihre Tierärzte. **[The Netherlands and their Veterinary Surgeons].**—*Dtsch. tierärztl. Wschr.* **49.** 238.

This is a summary of a lecture on veterinary affairs in Holland and lacks detail except as regards the control of bovine TB. In the voluntary control scheme there were 49,000 herds enrolled and 29,000 have been freed from infection. In 1938–39, 839,000 cattle were tuberculin tested and 140,000 (16%) reacted.

Meat inspection is on a high level in comparison with other European countries and carcass disposal is well provided for.—J. E.

LOCKAU, U. (1941). Zur Geschichte des staatlichen Veterinärwesens im ehemaligen Polen. **[The History of the State Veterinary Service in the Former Republic of Poland].**—*Berl. Münch. tierärztl. Wschr.* Nov. 21st. 573–574.

This consists mainly of a recital of the political-administrative changes undergone by the State veterinary service from 1918–39. The service was developed technically chiefly by FISCHÖDER, a German who was chief veterinary officer from 1922–30. Important diseases which had been eradicated since 1918 included glanders, dourine, bovine contagious pleuro-pneumonia, and rinderpest. [L. makes a disparaging remark on lack of progress in control of chronic infections such as TB., mastitis, and brucellosis although in Germany, too, the problem of controlling such diseases has not been solved.]—J. E.

BELLER, K. (1941). Warum die Verkürzung des Nutzungsalters unserer Milchkühe? **[The Reasons for the Shortening of the Productive Life of Milch Cows].**—*Berl. Münch. tierärztl. Wschr.* Aug. 22nd. 405–408.

A general argument condemning the common short-sighted methods of breeding cattle for increased and earlier productivity. Theory and practice show that the constitution is thereby commonly impaired and the results operate cumulatively on successive generations. As a consequence particular families of cattle have actually died out and in general farming the ill effects are reflected in the high wastage rates and early decline.

Productivity can only be safely raised by patient co-operation between the breeder, feeder, and veterinarian.—J. E.

KELLEY, R. B. (1941). **Animal Industries in Tropical Australia.**—*Emp. J. exp. Agric.* **9.** 153–165.

Broadly speaking, the flocks and herds of Australia, even in the tropical zone, are of European origin and are mainly the progeny of stock imported from Britain. In this article K. first reviews the climatic conditions of tropical Australia and stresses the great importance of subterranean water-supplies in view of the relatively low rainfall. The most serious disease of cattle is bovine contagious pleuro-pneumonia, which is general throughout the tropical belt. An excellent account of the sheep and beef cattle industries is given, in which K. deals with breeds, management, rate of growth, and average mortality due to climatic causes, *e.g.* drought. Dairy cattle, pigs, and other animals are also briefly dealt with. The importance of land and water conservation is discussed, and it is stated that, among other things, research work is proceeding on blowfly strike, the problems of drought feeding, fertility in sheep, piroplasmosis, and bovine contagious pleuro-pneumonia. The suitability of European cattle for the tropics is discussed, and it is pointed out that whilst certain experiments have shown that, on ecological grounds, hybrids would be excellent animals with which to stock the northern territories of Australia, certain important commercial considerations must be borne in mind. For example, in a country of high wages, for station cattle to be given adequate handling to reduce their nervousness, the added cost of labour must be associated with increased production or similar gain. Further study of ecological and commercial problems in relation to stock raising must be undertaken, and until these studies are made animal industries within the Australian tropics should be regarded as being in a formative rather than an established state.—N. J. SCORGIE.

MACDONALD, A. J. (1941). **Marketing of Eggs and Egg Products.**—*Indian Fmg.* **2.** 404–407.

A description, with special reference to Indian conditions, of methods of producing high quality eggs, of the principles of grading for exterior and interior quality, as well as of the chief types of egg faults and their causes. Measures to be taken to conserve the initial quality of fresh eggs during storage, particularly in the hot weather, and the importance of marketing them efficiently and quickly are also discussed. The preparation of frozen and dried eggs and the prospects for the development of these industries in India are dealt with.

—T. S. KRISHNAN.

KRISHNASWAMY, A. (1941). **Authors on Indian Veterinary Science: Their Works, Age and Antiquity.**—*Indian J. vet. Sci.* **11.** 107–112.

K., while touring India in connexion with an Imperial Council of Agricultural Research enquiry into indigenous systems of veterinary medicine, was able to study a number of ancient Indian veterinary writings, several of which were previously believed to have been lost. He advocates a systematic search for others. He confirms that Salihotra was the greatest authority in ancient India on horses and Palakapya on elephants. He describes

their work and suggests possible dates. Several earlier Indian veterinary writers are discussed and the debt owed by other medical systems of the past to India is stressed.—L. H. SHIRLAW.

OFFICIAL AND OTHER REPORTS

UNION OF SOUTH AFRICA. (1939). **Safeguarding the Union's Livestock Industry. Annual Report of the Division of Veterinary Services [for 1938-39].** [DU TOIT, P. J.]—*Fmg S. Afr.* **14.** 511–519.

Laboratory Work

BACTERIOLOGY.—The results of the block inoculation for ANTHRAX in the Transkei were the most successful recorded so far in that area. Failure to immunize horses with the ordinary vaccine was experienced, but the avirulent vaccine gave good results. Some samples of imported bone meal were found to be infected with anthrax and the existing import regulations were amended to ensure better sterilization. A centre was created at Onderstepoort for the determination of South African salmonella types as part of the International Committee's scheme. Experiments on the improvement of calf PARATYPHOID vaccine were continued. An experiment was commenced to study MASTITIS under South African conditions in a herd of 19 clean heifers. This experiment was to continue over some years and the milk of individual quarters to be examined by various tests. The production of a vaccine against BOTULISM in cattle was studied.

PROTOZOOLOGY.—Transmission of the South African strain of *Trypanosoma equiperdum* from natural cases to susceptible horses by subcutaneous inoculation of blood was successful and the strain has been maintained in equines. It was established in rabbits as well. No permanent cures could be effected by chemotherapy. Reinfection of old cases which still reacted strongly to the complement-fixation test was unsuccessful, but was successful in animals with weak reactions. In the control of NAGANA the use of the Harris trap was very successful during the year. Several miles of hessian screens were used to limit game movements and electrified fences gave promising results for this purpose.

VIRUS DISEASES.—The season under review was a particularly severe one for HORSE SICKNESS and the results from vaccination were excellent. Attempts to use mice and g. pigs instead of horses for testing immunity were disappointing. Virus strains were preserved by desiccation in the frozen state. A start was made in measurement of the size of the virus with gradocol membranes. A study was made of various rickettsial diseases such as MURINE TYPHUS, human TICK-BITE FEVER, and FIÈVRE BOUTONNEUSE. Unsuccessful attempts were made to infect ferrets with HEARTWATER. "Uleron" was found to have a specific therapeutic effect on the disease in sheep. Some success attended attempts at immunization of calves within three weeks of birth by intravenous inoculation of virulent blood of sheep.

PARASITOLOGY.—Intensive work was commenced in the study of the horn fly *Lyperosia minuta* in the attempt to find a repellent or a method of eradication.

BIOCHEMISTRY.—A new method was devised for the utilization of superphosphate as a water soluble phosphate, as a result of which the danger of poisoning by fluorine was eliminated. A method was devised for determining F in such minute amounts as ·01 part in a million of water. The cause of a form of LAMENESS in pigs was found to be vitamin A deficiency.

PHYSIOLOGY.—Studies on the physiology of digestion in ruminants which were continued included the motility of the fore-stomach, chemical investigations of the fermentative changes, and a study of the bacterial and infusorial flora of the rumen under various conditions.

NUTRITION.—It was found that sheep suffer from a deficiency of protein in the grazing from April to September. This deficiency could be supplemented by giving 4½ oz. maize or 2 oz. peanuts daily as additional feed.

PHARMACOLOGY AND TOXICOLOGY.—During the year the first successful isolation of the toxic principles of several species of *Senecio* was carried out.

Field Work

ANTHRAX.—The position in Natal and the Transkei was very satisfactory as a result of wholesale vaccination. A heavy mortality in horses in the Orange Free State and in sheep in an area in the Western Transvaal was observed.

EAST COAST FEVER.—There was a decrease

in the number of outbreaks but the general position was somewhat disappointing in Natal as fresh outbreaks occurred in areas which had been free from some years.

DOURINE.—Steady progress was made in the elimination of the disease from the West Cape Province, but in other parts of the Union little progress was made. Owing to innumerable practical difficulties a general campaign could not be undertaken. Evidence is available that the disease is much more widespread than had previously been believed and a wide preliminary survey would be necessary before a systematic campaign could be undertaken.

FOOT AND MOUTH DISEASE.—Two outbreaks occurred during the year. The lesions were rather severe. As distinct from previous outbreaks sheep and goats were quite commonly found to be infected in the outbreak at Pilgrims' Rest, and showed chiefly foot lesions. The slaughter policy was effectively carried out in this and another outbreak which occurred in the Barberton district of the Transvaal near the Mozambique border.

SWINE FEVER.—During the year two outbreaks occurred, both in the Pietersburg district of the Transvaal.

SHEEP SCAB.—The general position was satisfactory, but there were a few widely scattered outbreaks due to long distance trekking for grazing purposes.—E. M. R.

UNION OF SOUTH AFRICA. (1940). **Safeguarding the Union's Livestock Industry. Annual Report of the Division of Veterinary Services [for 1939-40].** [DU TOIT, P. J.]—*Fmg S. Afr.* **15.** 480-484.

Laboratory Work

BACTERIOLOGY.—The avirulent spore vaccine for ANTHRAX was used on a much wider scale with good results. The issue was begun of a BLACKLEG vaccine to which alum had been added and of which the preliminary tests had given very good results. The herd of initially uninfected cows in a MASTITIS experiment passed through the first lactation period without any cases of mastitis developing; they were kept in isolation and not exposed to any known infection. Calfhood vaccination against CONTAGIOUS ABORTION under field conditions was started. In the poultry diseases section it was found possible to reduce the mortality from tumour conditions by two-thirds by selective breeding.

PROTOZOOLOGY.—The maintenance of the strains of REDWATER and ANAPLASMOSIS in cattle bred at Onderstepoort and kept tick free was very successful and avoided the importation of expensive cattle from overseas. The South African strain of *Trypanosoma equiperdum* has been maintained in equines for 18 generations.

VIRUS DISEASES.—The virus particle of HORSE SICKNESS was found to be about 50$\mu\mu$ and a method of preserving the virus in the frozen state was perfected. The difficulty in immunizing foals from immune mares was found to be due to the temporary immunity which the foals develop from the colostral milk and which lasts about six months. Encouraging results were obtained in the treatment of HEARTWATER with uleron and in the immunization of young calves. A field laboratory was established in Tanganyika for the preparation of RINDERPEST vaccine and just over a million doses were produced.

PARASITOLOGY.—With the importation of rams from overseas for fat lamb production, a species of lungworm, *Muellerius*, has been introduced and has caused a good deal of trouble. Progress has been made in blowfly research and in combating the horn fly (*Lyperosia*).

BIOCHEMISTRY.—The cause of "SWAY-BACK" in lambs, a condition apparently associated with a copper deficiency, was investigated. In connexion with this, the effect of calcium in the soil on the assimilability of Cu in plants, was studied. The study of the digestion of cellulose in the fore-stomachs of sheep was continued.

PHYSIOLOGY.—Studies of the ruminal digestion of sheep showed that the process is very complicated. In connexion with PHOTOSENSITIZATION in sheep, studies were undertaken to find which wavelengths in sunlight were responsible.

SURGERY AND SEX PHYSIOLOGY.—Observations in merino sheep showed that a period of ANAPHRODISIA was to be expected in late spring and early summer. The transfer of rams from one locality to another induced a temporary STERILITY. The oestrous periods of heifers of certain breeds of cattle were found to be much shorter than those recorded in Europe. It was shown that the activity of ovine spermatozoa could be maintained for 72 days *in vitro*.

SHEEP AND WOOL RESEARCH.—A comprehensive programme of studies was carried out

which included the genetics of the merino fleece, studies of wool yolk, yield determinations, and methods of sampling. Approximately 2,000 nose prints were made of merino sheep and, based on these, an infallible method of identifying individual sheep was evolved.

Field Work

ANTHRAX.—The number of outbreaks recorded was much lower than in previous years. Approximately 2,800,000 cattle were inoculated under official control.

TUBERCULOSIS.—Seventy-two herds were under official test in the various provinces and it is hoped that the number will be greatly extended in more normal times.

EAST COAST FEVER.—The position in Natal showed improvement, there being only four fresh outbreaks during the year. One outbreak occurred in the Cape East area with a heavy mortality, and the slaughter policy was applied. Only one outbreak occurred in the Transvaal.

DOURINE.—A number of cases was discovered in all provinces except Natal.

FOOT AND MOUTH DISEASE.—No outbreaks occurred during the year.

RABIES.—Cases were encountered in 11 cattle, 1 sheep, 1 pig, 4 dogs, 22 meerkats, 2 jackals, 1 genet cat, and 1 polecat.

HORSE SICKNESS.—Although in most horse sickness areas it was a mild season for the disease, with few deaths, a wave of the disease swept through several areas in the South West Cape with severe losses. These areas are rarely involved in horse sickness epizootics.

SWINE FEVER.—Three outbreaks occurred in the Cape Province, being dealt with by slaughter; one which occurred in pigs at the Johannesburg abattoir could not be traced to its source.

SHEEP SCAB.—There were 38 outbreaks as compared with 35 in the previous year. All the outbreaks were confined to the Cape Province and the Transvaal.—E. M. R.

INDIA. (1940). **Annual Administration Report of the Civil Veterinary Department, Bombay Province including the Bombay Veterinary College and the Bombay City and Harbour Veterinary Department For the Year 1939-40.** [FARBROTHER, E. S., & DEEN, M. M.] pp. 75. Bombay: Superintendent, Govt. Printing & Stationery. [8vo] [Annas 5 or 6d].

The staff consisted of one officer in the Indian veterinary service, one in class I and seven in class II of the provincial veterinary service, three veterinary inspectors, three college lecturers, and 145 veterinary assistant surgeons. In addition, there was one veterinary investigation officer appointed by the Imperial Council of Agricultural Research. At the beginning of the year, there were 139 students attending the college, 39 of whom obtained the diploma.

Over 2,900 specimens for diagnosis were examined, while at the veterinary hospitals and dispensaries, 241,756 cases were treated and 36,539 animals castrated.

There was some reduction in the number of disease outbreaks reported during the year, *viz*, 3,265 as against 4,095 in 1938-39. With the exception of RINDERPEST and ANTHRAX, there were fewer outbreaks of the more important diseases, the greatest reduction being in FOOT AND MOUTH DISEASE. The number of outbreaks of RINDERPEST, after a gradual decline in recent years, showed a slight increase this year throughout most of the province, 253 outbreaks being reported. Outbreaks of other diseases reported included:—BLACKLEG 785, HAEMORRHAGIC SEPTICAEMIA 630, ANTHRAX 162, BOVINE SURRA 187, EQUINE SURRA 68, and FOOT AND MOUTH DISEASE 1,065. Deaths were reported in sheep and goats from ANTHRAX (12+23 respectively), POX (643+70), FOOT AND MOUTH DISEASE (4 goats), and SCAB (40+60). In fowls 303 deaths were reported from FOWL CHOLERA, 311 from FOWL POX and 3,617 from NEWCASTLE DISEASE. Fifty-two deaths were reported in dogs from RABIES.

The production of goat-virus vaccine against RINDERPEST was extended, 179,740 doses being issued. The total number of stock inoculated was 145,954 as compared with 180,466 in the previous year; 26,400 cattle were vaccinated with goat-virus vaccine or serum or both during the course of outbreaks. 7,502 cattle were vaccinated against HAEMORRHAGIC SEPTICAEMIA and 2,469 against BLACKLEG, the latter figure representing a large increase over that of the previous year. 1,453 animals were inoculated with ANTHRAX serum and in one outbreak 97 with spore vaccine. 1,933 fowls were inoculated against FOWL POX and 98 birds were inoculated in two outbreaks of FOWL CHOLERA with serum-vaccine and 26 with serum alone. The fees from these sources showed an increase of Rs. 6,000.

A tick control scheme was extended by opening two more dipping tanks and by the erection of a second spraying machine.

The veterinary investigation officer's work included investigations into the incidence of TUBERCULOSIS, JOHNE'S DISEASE, MASTITIS, and ABORTION in cattle. Promising results were obtained in an attempt to eradicate NASAL GRANULOMA from cattle in one village. Investigations were also conducted on diseases of sheep, goats, and fowls.

The Bombay City and Harbour veterinary department continued its inspections of imported and city stabled horses.—L. H. S.

UNITED STATES OF AMERICA. (1938). **Report of the New York State Veterinary College at Cornell University for the Year 1936-37.** [HAGAN, W. A.] pp. 166. Albany: J. B. Lyon Company. [8vo]. [This report arrived late in the Bureau: see *V. B.* **10.** 899 for report for 1937–38].

In this report the pressure on teaching facilities by the growing number of students is discussed: steps to relieve this were taken, to be effective in the following year.

Reports, largely in tabular form, are given of the clinical and laboratory work, also descriptive reports of the two poultry disease laboratories at Ithaca, N.Y., and at Farmingdale, Long Island.

As usual the bulk of the report is made up of research and general veterinary articles, reprinted from various scientific periodicals. They have all been dealt with in *Index Veterinarius* and some in the *Vet. Bull.*—J. E.

Extracts from Annual Reports of Agricultural Experiment Stations, U.S.A. [The matter given here is a bare outline of the work done. When papers by the staffs of these stations are published abstracts are prepared from them and included in the *Veterinary Bulletin* as a matter of routine. Details of the titles of these reports and of relevant papers contained in them will be found in the *Index Veterinarius*].

ALABAMA, 1939.—Results of a NEMATODE INFESTATION survey on 525 fowls are given. Work was also done on vitamin A and on the B complex, including requirements of cattle and rats and the changes caused by deficiency. Cocks kept in darkness became infertile. Progress in breeding strains of fowls resistant to FOWL PARALYSIS was made.

IDAHO, 1939.—Studies were made on the bacteriology of MASTITIS and its treatment by X-rays, diathermy, vaccines and chemical substances, none of which alone or combined yielded more than partial success. A SWINE ERYSIPELAS survey in Idaho was begun. Fowl mortality as related to pedigree was studied and progress was made in breeding hardy stock. Notes on the eradication of BACILLARY WHITE DIARRHŒA are given.

INDIANA, 1938–39.—A table gives the results of routine blood tests for BOVINE BRUCELLOSIS. The progress of a calfhood vaccination experiment is described (agglutination titres and breeding history). Evidence on the effects on piglet mortality of malnutrition of sows was obtained experimentally. A progress report of the year's results of a long term research on FOWL PARALYSIS and LEUCOSIS is given; notes are given on local cases of EQUINE ENCEPHALOMYELITIS and ENCEPHALOMYELITIS in chicks. Tests for potency of SWINE FEVER virus and serum were carried out. Notes on a general P.M. diagnosis service are given.

NORTH CAROLINA, 1938.—In a study on pigeon PARATYPHOID in which the causal organism was recovered from birds reacting negatively to the agglutination test, detailed cultural work identified the organism as *Salmonella typhi-murium* var. *binns*. In research on SALMONELLA INFECTION in fowls, work failed to demonstrate a Vi antigen in *S. pullorum* or *S. gallinarum*. Healthy fowls were found to possess agglutinins for almost all the known O antigens of nine species of *Salmonella* (1 : 25 dilution). Studies on line breeding in relation to livability and FOWL PARALYSIS were begun and data on mortality were collected. A helminth survey showed that *Raillietina tetragona* and *R. echinobothrida* are common poultry tapeworms in N.C. Their life history is being studied.

OHIO, 1937–38.—Notes appear on the incubation period in BOVINE BRUCELLOSIS, on tests of crystal-violet vaccine against SWINE FEVER, treatment of HELMINTHIASIS in sheep, and "overeating" or "apoplexy" in fattening lambs.

OKLAHOMA, 1936–38.—Research was limited to nutritional deficiencies (PEROSIS in chicks and vitamin A). A local disease of cattle fed on cottonseed meal and regarded as due to this,

was found to be an avitaminosis A: cottonseed meal was proved to be innocuous.

RHODE ISLAND, 1937–38.—The cultivation of *Haemophilus gallinarum* was greatly facilitated by means of a yeast medium. Attempts to immunize fowls by such cultures failed, but they were of value in the preparation of a diagnostic antigen. Sodium sulphanilyl sulphanilate and silver nitrate were both useless against CORYZA. Work was begun on virus and bacteria associated with AVIAN INFECTIOUS BRONCHITIS. Birds cannot be immunized *via* the cloaca as in LARYNGOTRACHEITIS. "Iodine vermicide" (Merck) was found effective against gapeworms in pheasants. A summary of P.M. examinations on poultry is given.

UTAH, 1938–40.—The hygienic principles of control of MASTITIS in the station herd are outlined. Post-parturient HAEMOGLOBINAEMIA in dairy cows is described: work suggested that a phosphorus deficiency was involved and early reports on the therapeutic use of dibasic sodium phosphate were favourable. 136,000 blood samples were tested for BRUCELLOSIS. A bone deformity of growing turkeys was investigated.—J. E.

—. (1940–41). Tierseuchen im Auslande. [**Animal Diseases in European Countries (excluding Germany)**].—*Reichsgesundheitsblatt*. **15.** 100 and 224; **16.** 344, 428, 540, 628, 724 and 896.

These statistical tabular reports are compiled from weekly, fortnightly, or monthly data for 1941 supplied by many of the European countries. They refer to anthrax, glanders, fowl cholera, blackleg, swine erysipelas, dourine, bovine contagious pleuro-pneumonia, foot and mouth disease, rinderpest, sheep pox, swine fever, rabies, and equine mange.—J. E.

SWEDEN. (1941). Det civila veterinärväsendet år 1939. [**Report of the Civil Veterinary Service for 1939**]. [ALEGREN, A.] pp. 47. Stockholm: Kungl. Boktryckeriet. [8vo].

STATE VETERINARY BACTERIOLOGICAL INSTITUTE.—The staff is given: Professor HJÄRRE was placed in charge from October, 1939. Statistical figures are given of the work done.

VETERINARY PERSONNEL.—The number of qualified veterinarians in Sweden was 604. Twenty were occupied in central administration, 23 were teachers, 26 were in the army, 259 were district veterinarians, and 49 were employed for disease control by provincial agricultural societies. Only 94 were in private practice.

LIVESTOCK DISEASES.—FOOT AND MOUTH DISEASE occurred in the south but died out gradually during the spring and summer [for a detailed report, see *V.B.* **11.** 511]. There were 41 outbreaks of ANTHRAX, 7 of BLACKLEG, and 24 of BACILLARY WHITE DIARRHOEA. 6,849 cases of BOVINE BRUCELLOSIS in 1,780 herds were diagnosed; 123 cases of EQUINE INFECTIOUS ANAEMIA were also diagnosed. No cases of glanders, equine contagious abortion, fowl cholera, swine fever, sheep pox, rabies, fowl plague or mange in horses or sheep were observed. In the control of BOVINE TUBERCULOSIS, 38,000 herds with 265,000 cattle were tuberculin tested for the first time and 86% were found free of infection. In the remaining 14% (5,000 herds with 69,000 cattle), 19,000 cattle (28%) reacted. In these two groups of cattle tested for the first time, the average reactor percentage was 7·3. 93·4% of 50,000 herds with 645,000 cattle retested were "clean" and only 8·4% of 97,000 cattle in 3,350 of the retested herds reacted (average reactors in both these groups 1·3%). 16,860 herds with 253,000 cattle were under control by the Ostertag method: the following numbers of open cases were detected—12,840 pulmonary, 300 mammary, and 194 vaginal. State compensation paid for these amounted to about 490,000 kr.

VARIOUS.—Statistical information is given of animals treated for disease by the district veterinarians, of meat inspection, and of milk inspection.—J. E.

BOOK REVIEWS

HOLMES, W. H. [Professor of Medicine, Northwestern University Medical School; Chairman, Department of Medicine, Passavant Memorial Hospital, Chicago]. (1940). **Bacillary and Rickettsial Infections. Acute and Chronic. A Textbook.** pp. 676. London & New York: The Macmillan Company. [8vo] [25s.]

In view of the large number of excellent text books dealing with every aspect of medical education, which is now available, it has

become extremely difficult for an author to present in an original manner the essential factual data which are required to enable the student to prepare for examinations and, at the same time, to develop his critical faculties. The author, who has had a wide experience of teaching, has written a most thoughtful and unusual book which will undoubtedly serve to stimulate the student with the enquiring mind. His outlook on bacteriology is not unlike that of the late Professor W. BULLOCH who, as an acknowledged authority on the history of medicine, constantly stressed the importance of an historical background as a necessary adjunct to a proper understanding of human disease. The author holds that " illness is often the result of a long series of social and economic maladjustments, hereditary tendencies, insanitary conditions, vicious habits or educational neglect ", and that an acquaintance with the evolution of the art of medicine must benefit both students and practitioners.

The book, which is divided into eight sections, surveys the infections of man caused by pasteurella, rickettsia, brucella, *Haemophilus*, *Mycobacterium*, and enteric organisms as well as certain bacillary intoxications, *viz*, diphtheria, botulism, tetanus, and gas gangrene. The final chapter deals with miscellaneous infections, some of which may be transmissible from animals to man, such as anthrax, glanders, swine erysipelas, etc. It is evident from this list that the present volume covers a limited field, but the author points out that the virus diseases and infections of coccal, spirochaetal, and protozoal aetiology have been left for a subsequent publication.

Although primarily intended for medical students, this book can be cordially recommended to those who are especially interested in the historical background of medicine. The book is provided with an adequate bibliography.—R. E. GLOVER.

BLACKLOCK, D. B. [M.D. (Edin.); D.P.H. (London); D.T.M. (Liver.) Professor of Tropical Hygiene, Liverpool School of Tropical Medicine, the University of Liverpool], & SOUTHWELL, T. [D.Sc., Ph.D., A.R.C.Sc., F.Z.S., F.R.S.E., Formerly Walter Myers Lecturer in Parasitology, School of Tropical Medicine, The University, Liverpool]. (1940). **A Guide to Human Parasitology for Medical Practitioners.** pp. viii + 259. 122 figs. London: H. K. Lewis & Company, Ltd. [4th Edit.] [8vo] [12s. 6d.]

The greater portion of this elementary textbook of medical parasitology is taken up by descriptions and life-histories of human protozoan and metazoan parasites, and by an ingenious series of plates illustrating their life-histories. Included among such parasites are, of course, several of veterinary importance, *e.g. Trichinella spiralis* and *Leptospira* (here called *Spirochaeta*) *icterohaemorrhagiae*. Certain other parasites, which are true animal pathogens and only rarely infest man, are also dealt with, *e.g. Fasciola hepatica*. The information given, however, is of an elementary and factual nature, intended chiefly to aid the beginner in diagnosis. A table shows the parasites which occur in animal flesh, their pathogenicity for man, and whether or not flesh containing them is condemned at meat inspection.

The opening chapters on the use and care of the microscope and on the examination of material cover briefly the fundamentals of technique, and the book ends with a list of equipment and reagents necessary in laboratory diagnosis.—E. S.

WAISMAN, H. A. [Ph.D., Research Associate in Biochemistry, University of Wisconsin], & ELVEHJEM, C. A. [Ph.D., Professor of Biochemistry, University of Wisconsin]. (1941). **The Vitamin Content of Meat.** pp. ii + 210. Minneapolis, Minn.: Burgess Publishing Co. [4to] [$3.00].

Although this book is written mainly from the human point of view, veterinarians will find the chapters on the distribution in animal tissues of vitamin A and of the vitamins of the B complex especially interesting as meat is a source of these essential factors for dogs, many fur animals, pigs, and poultry. After a general introductory chapter on the importance of an adequate and balanced diet to the wellbeing of man, the nutritive value of meat is discussed from the point of view of growth, reproduction, and lactation and of the treatment of certain pathologic disorders. A chapter is then devoted to each of the vitamins, dealing with their chemistry, physiology and pathology, methods of assay, and distribution in animal tissues. The material is well set out and a good bibliography is given at the end of each chapter.

—R. ALLCROFT.

3230—Wt.P516—Dd.176—750—5/42—H. R. G. Ltd.—G.13
Printed under the authority of His Majesty's Stationery Office by H. R. GRUBB, LTD., Croydon

INDEX VETERINARIUS

The publication of *Index Veterinarius* commenced with the indexing of the literature of 1933. It is a complete index of current publications relating to veterinary research, public health, administration, education and other aspects of veterinary science.

The latest list of the publications indexed for this purpose was included in *Index Veterinarius*, Vol. 6, No. 1 (issued December, 1938) and also circulated with the *Veterinary Bulletin*, Vol. 9, No. 1.

About 10,000 references are indexed each year, each reference being suitably cross-indexed alphabetically under subjects and under names of authors.

As each half-yearly issue consists of a single complete alphabetical index of subjects and authors' names, a search through it involves a minimum of trouble, and all information required is readily found.

Each number contains the indexing done by the Bureau during the previous half-year, *i.e.*, No. 1, issued in December, covers the indexing done during the previous January to June.

The dates of issue of the two numbers of each volume are as follows :—

No. 1.—Issued December.	Indexing period previous January—June.
No. 2.—Issued June.	Indexing period previous July—December.

Vols. 1 to 3 (1933, 1934 and 1935) of the Index were produced on a duplicator; from Vol. 4 onwards it has been printed.

Vols. 1 to 5 were issued in quarterly parts; the issue is now half-yearly.

Annual Subscription, £5.

A limited number of copies printed on one side only are available for those who wish to mount references on cards.

Orders may be sent to :—

CENTRAL SALES BRANCH,
(IMPERIAL AGRICULTURAL BUREAUX),
AGRICULTURAL RESEARCH BUILDING,
PENGLAIS,
ABERYSTWYTH,
N. WALES.

Imperial Bureau of Dairy Science

Shinfield, Reading, England

DAIRY SCIENCE ABSTRACTS

A comprehensive collection of abstracts of current literature dealing with milk and dairy products: husbandry, technology, control and standards, economics, physiology, bacteriology and mycology, chemistry and physics. Published quarterly. Subscription 25s. per volume of 4 numbers (5s. discount to British subjects who subscribe direct): single copies, 7s. 6d.

Technical Communications

No. 1. The phosphatase test for control of efficiency of pasteurisation. H. D. Kay, R. Aschaffenburg and F. K. Neave. Price 2s. (postage 2d. extra).

Imperial Bureau of Animal Nutrition

Rowett Institute, Aberdeen, Scotland

NUTRITION ABSTRACTS AND REVIEWS

Consists of abstracts of papers published throughout the world dealing with the subject of nutrition in all its aspects. They are arranged under the following sections: technique (including chemical and experimental methods), composition of food, physiology of nutrition, human diet in relation to health and disease (including dietary studies, food economics, deficiency diseases and therapeutic dietetics), feeding of animals and book reviews. Each issue also contains a review article on some subject of general interest.

Published quarterly. Annual subscription 42s.

Technical Communications

These are published at irregular intervals; lists and prices on application.

Imperial Bureau of Animal Breeding and Genetics

King's Buildings, University of Edinburgh

ANIMAL BREEDING ABSTRACTS

This journal contains abstracts and reviews of current publications bearing on animal breeding, genetics, production, sex physiology, reproduction and cognate subjects. Published quarterly. Subscription rate, 25s. per annum.

Occasional Communications and *Bibliographies* are also issued from time to time.

Imperial Bureau of Pastures and Forage Crops

Agricultural Buildings, Alexandra Road, Aberystwyth

This Bureau covers current literature on grassland, forage crops and plant biological research, and issues two quarterly publications:—

HERBAGE ABSTRACTS and HERBAGE REVIEWS

The latter publication contains original articles and reviews on topics which merit more detailed consideration than can be given in the former.

Subscription rates: *HERBAGE ABSTRACTS.* 25s. per annum (single parts, 7s.).
HERBAGE REVIEWS. 15s.* per annum (single parts, 4s.).

*A reduction of 5s. will be made when *HERBAGE ABSTRACTS* is also ordered.

At irregular intervals larger monographs are published on miscellaneous subjects in the form of *Bulletins*.

All correspondence regarding subscriptions to journals and sales of occasional publications should henceforth be addressed to: Central Sales Branch (Imperial Agricultural Bureaux), Agricultural Research Building, Penglais, Aberystwyth.

Printed in Great Britain by H. R. Gruss, Ltd., Croydon.